

UNIVERSITY OF KWAZULU – NATAL

TITLE OF DISSERTATION

**“Why Projects executed within Denel UAVS do not meet the objectives as set out in the
beginning of the project?”**

by

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in the

Faculty of Management Studies

Graduate School of Business

at



Supervisor: Prof. Sam Lubbe

DECEMBER 2006

CONFIDENTIALITY CLAUSE

15 December 2006

TO WHOM IT MAY CONCERN

RE: CONFIDENTIALITY CLAUSE

Due to the Company Confidential information contained in this research it would be appreciated if the contents remains confidential and not be circulated for a period of five years.

Sincerely

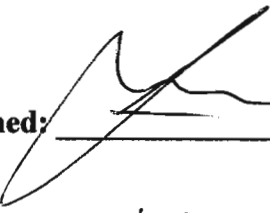
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DECLARATION

I, the undersigned, hereby declare that this dissertation is my own unaided work. It is submitted in partial fulfilment of the degree of Master of Business Administration at the University of KwaZulu Natal.

This research has not been previously accepted for any degree and is not being currently submitted in candidature for any degree.

Signed:  _____

Date: 15/12/2006 .

ACKNOWLEDGEMENTS

I would like to thank my family, (my wife Renitha and sons Kirash and Tashiq) who have provided me with the necessary support in this research study. The successful completion of the research and the writing of this dissertation would not have been possible without their love and support.

I also want to thank my supervisor, Prof. Sam Lubbe for guiding me and advising me on the subject matter of this research and the process involved in writing up the dissertation.

Lastly, I would also like to thank the Management and employees of Denel UAVS. Without their support, this project would not have been successfully completed.

ABSTRACT

This research project focuses on understanding the reasons why projects executed within Denel UAVS do not meet the objectives as set out in beginning of the project and inevitably, the project fails.

The aim of the study is to meet the following objectives:

- 1) To evaluate the effect the current project management process practiced within Denel UAVS has on project success.
- 2) To evaluate the effect of size and complexity of projects executed within Denel UAVS has on project success.
- 3) To establish the most important interpersonal skills required by project managers, within Denel UAVS for project success.
- 4) To evaluate the influence the current organisational structure within Denel UAVS has on project success.

The research method for this research project consists of two phases: namely phase one – Literature Review and phase two – Empirical study. The Literature review was conducted to evaluate the common reasons for project failure and to gain a better understanding of defining project success. A survey questionnaire was distributed to employees of Denel UAVS to obtain quantitative data as part of the Empirical study.

The research provides information on results obtained and specific analysis of data collected from employees within Denel UAVS. The research also provides information on the reasons for project failure within Denel UAVS.

The researcher makes recommendations to the management of Denel UAVS based on the results obtained from this study.

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CHAPTER 1

SCOPE OF THE RESEARCH

1.1 Introduction

This research project dealt with understanding the reasons for project failure within Denel Un-manned Aerial Vehicle Systems (UAVS) part of the Denel Aerospace Systems (DAS). In chapter 1, the background and motivation, the problem statement and the objectives of the research project are presented. Subsequently the research design, the research method and the study layout are discussed.

1.2 Background and Motivation for Research

The researcher is currently employed at Denel UAVS in the capacity of Programme Manager. The researcher observed many inefficiencies and anomalies within the project management domain during the execution of projects with Denel UAVS. This phenomena also presented itself within other business units in Denel Aerospace Systems and other similar Defence Equipment Supply companies.

A study of this nature was not conducted within Denel UAVS before, however many improvement initiatives have been implemented to overcome the inefficiencies and anomalies within the Project Management domain of Denel UAVS.

The researcher held discussions with the General Manager of Denel UAVS, Mr Tsepo Monaheng. The researcher shared his interest in conducting such a study within the company. Mr Tsepo Monaheng agreed with the researcher that such a study is necessary and has documented his approval in a letter attached in Appendix – A of this research. Mr Monaheng's main concern is to understand why projects executed within UAVS do not meet the objectives as set out in beginning of the project, inevitably the projects fail and this impacts on the profitability, perceived image, reputation and credibility of the company.

1.3 Problem Statement

DENEL Aerospace Systems is part of the Aerospace Group of the state-owned Denel (Pty) Ltd. Over the past decade, Aerospace Systems has managed to increase its exports from 10%

to more than 50% of turnover. Aerospace Systems strength lies in developing, producing, integrating and supporting unique solutions aimed at the particular requirements of each customer, (www.kentron.co.za, 2006).

Some of the latest export products included in Denel's Aerospace product portfolio include the Ingwe anti-armour missile, the Umkhonto air-defence missile and the Seeker observation UAV, (www.kentron.co.za, 2006).

DENEL Un-manned Aerial Vehicle Systems (UAVS) is a business unit within DENEL Aerospace System. The financial figures as contained in the UAVS Strategy Document, indicates that UAVS for the past two years has shown a Profit Volume percentage of 13 % for Financial Year 04/05 and 22% for Financial 05/06. The labour cost for both financial years have remained unchanged and the material cost escalation was negligible, notwithstanding that the projects being executed were the same between the financial periods. This indicates that possible inefficiencies exist within the company for the Profit Volume percentage to fluctuate by 9% over the two years especially considering that the same projects were executed between both financial years. One of the key Business Management Improvement imperatives is to improve the Operational Processes within UAVS, (UAVS Strategy Document, 2006).

During discussions with Mr. Tsepo Monaheng: General Manager UAVS, he shared his concerns regarding challenges experienced in executing Denel UAVS' contractual obligations with both local and overseas clients. Mr. Monaheng has stated in a letter dated 29 June 2006, "that it would be beneficial for Denel UAVS to understand the reasons why projects executed within UAVS do not meet the objectives as set out in beginning of the project, inevitably the projects fail and this impacts on the profitability, perceived image, reputation and credibility of the company" (Appendix-A).

One of the core skills within UAVS is Project Management; therefore, the objective of this research is to understand why projects fail within the context of the project management process and the impact of the social interaction of the project team members on project success.

The research approach will be qualitative by nature and falls within the ambit of Management Research. Data will be collected by means of a survey type questionnaire. The collected data

will be analysed by a statistical software tool and will be documented in typical graph and tabular format.

A meeting will be convened with Mr. Tsepo Monaheng to discuss the results of the research and to suggest recommendations to improve the success rate of projects within Denel UAVS.

1.4 Objectives of the Study

- 1) *To evaluate the effect the current project management process practiced within Denel UAVS has on project success.*
- 2) *To evaluate the effect of size and complexity of projects executed within Denel UAVS has on project success.*
- 3) *To establish the most important interpersonal skill required by project managers, within Denel UAVS for project success.*
- 4) *To evaluate the influence the current organisational structure within Denel UAVS has on project success.*

1.5 Research Design

The research design for this study is based on the following process described in Figure 1.5.1

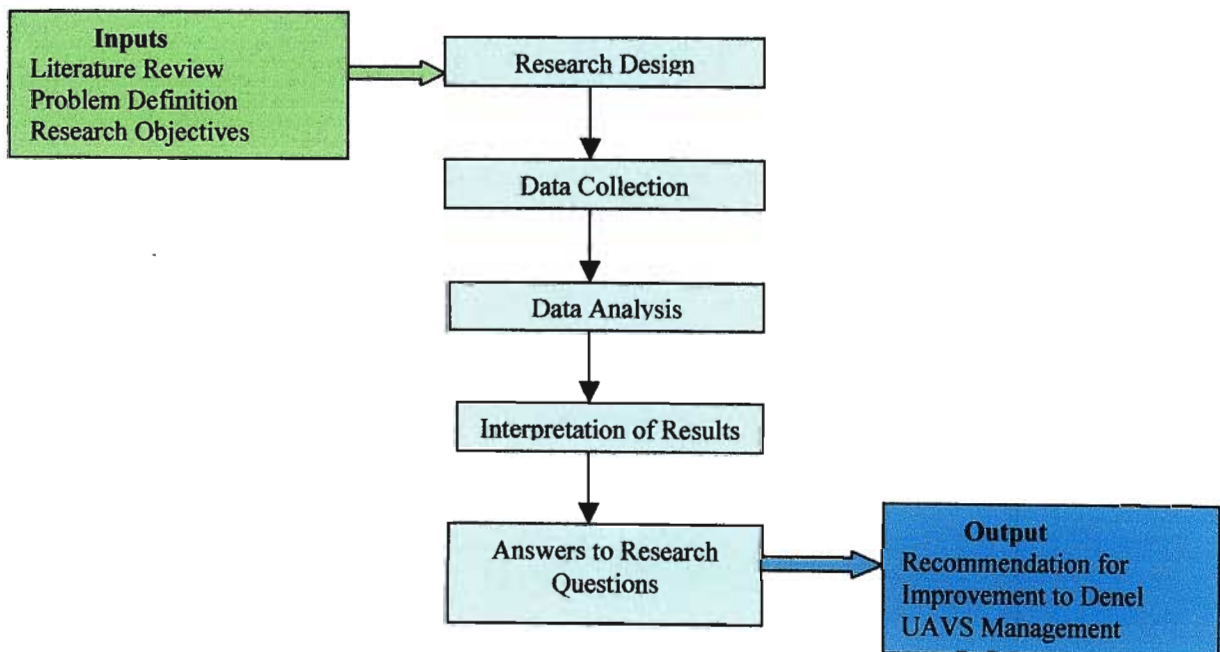


Figure 1.5.1- Research Design Process

This research project is a descriptive study. Sekaran (2001) explains that a descriptive study is undertaken in order to ascertain and be able to describe the characteristics of the variables of interest in a situation. Sekaran (2001) also explains that the goal of the descriptive study is to offer a profile or to describe relevant aspects of the phenomenon of interest to the researcher from an individual, organisational, industry orientated or other perspective. The purpose of this study is to understand the characteristics of a group (Denel UAVS) in a given situation to understand why projects are unsuccessful within the organisation.

The research project employed a survey design to collect primary, quantifiable data as part of the empirical study to answer the research objectives. The survey design was also used to describe central tendencies between variables, to evaluate the measures of dispersions and to look at variability in a specific set of observations.

1.6 Research Method

The research method for this research project consists of two phases: phase one – Literature Review and phase two – Empirical study.

1.6.1 Literature Review

The Literature review was conducted to evaluate the common reasons for project failure and to gain a better understanding of defining project success.

1.6.2 Empirical Study

The empirical study of this research was broken down into five parts; each part of the empirical study is discussed in the following paragraphs.

Part 1: Determining of the number of participants

The population size defined for this study consisted of 56 “direct employees.” “Direct employees,” indicates all employees within Denel UAVS that book project hours in execution of a task within the project. Due to time constraints, the entire population could not be surveyed. A random probability sample of 48 employees was chosen to be surveyed. The sample sizes was based on the table of Krejcie & Morgan (1970), *cited by Sekaran et al.* (2001), who stipulates a sample size of approximately 48 cases, to be representative of the population of 56.

Part 2: Choice of Survey Instrument

The measuring instrument used in this research project was a self-administered questionnaire distributed to the participants.

Part 3: Data Collection

Data was gathered by means of a self-administered questionnaire forwarded to participants electronically via personalised e-mail. The questionnaire provided the respondents with the motivation and objective of the survey. The questionnaire also informed the participants that their participation was voluntary and their identity remained anonymous. The participants were offered two options for returning the questionnaire to the researcher; either by email reply or by means of company internal mail services. The company's internal mail service makes use of internal mail envelopes, which is courier to the recipient by the company's mail service employees. The participants in the survey who chose to make use of the internal mail service, had to insert the completed questionnaire into the internal mail envelope and forward to the researcher.

Part 4: Data Analysis and Results of Empirical Study

The data collected from the survey was edited by the researcher and coded for inputting in the SPSS statistical software tool. After specific sections of the questionnaires were statistically analysed the results of the survey was interpreted by the researcher, presented in tabular format and expressed graphically.

Part 5: Conclusions, Limitations and Recommendations

The final part of the empirical study consisted of drawing conclusions and meeting the research objectives based on the results obtained from the data analysis. The limitations of the study, as well as topics for future research were highlighted and presented. Recommendations for improvement to the project management process and the project management domain within Denel UAVS were documented for Top and Senior Management's action.

1.7 Layout of the Study

The research project was divided into five chapters. A brief description and summary of each chapter is given below:

Chapter 1 – An overview of the problem statement is given, indicating the reasons for this research project. The research design, the research method and the study layout are also discussed in this chapter.

Chapter 2: Literature review – The purpose of this chapter is to evaluate the common reasons for project failure and to gain a better understanding of defining project success. A brief history into the profession of project management was presented and the professional practice of project management was discussed.

Chapter 3: Research Methodology – This Chapter outlined the research methodology that guided the empirical component of this research project. It also described the empirical process in terms of determining the sample, the development of the questionnaire, the use of measurement scales and the handling of the data.

Chapter 4: Discussions of Findings - provided information, results and specific analysis of data collected from employees with Denel UAVS.

Chapter 5: Conclusions, Limitations and Recommendations - focused on meeting the research objectives. Conclusions were drawn from the research and the limitations of the research were evaluated. In this chapter, recommendations based on the findings of this research were made to the senior management of Denel UAVS.

1.8 Chapter Summary

This chapter offered an introduction to the problem, a background and a motivation for the research project and the problem statement. The research design, research methodology and the layout of the study were discussed. In chapter 2, the emphasis will be on evaluating the common reasons for project failure and gaining a better understanding of the definition of project success. A brief history into the profession of project management and the professional practice of project management will be discussed.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In Chapter 1, an overview of the problem statement is given, indicating the reasons why this research project is needed. The research project falls within the profession of Project Management and the subject of Management Practices. In the research project, the generally defined good practice of project management, as defined by the Project Management Body of Knowledge (PMBOK, 2004) will be discussed. The study will evaluate the most common reasons for project failure as highlighted by authors who have conducted studies within the profession of project management.

Following the conversations with Mr. Tsepo Monaheng and the concerns raised concerning project failure, it must be noted that even with the vast availability of articles and literature on project failure and lessons learnt from various authors' experiences how to prevent projects failure (Appendix B), many organisations as described in the Standish Group Chaos Report, still encounter projects that fail.

Articles were gathered and the literature reviewed by narrowing the search, using key words, such as **project management**, **project failure**, **project success** and **project performance**. The internet was used to obtain the relevant information, the keywords were entered into the search engines and data bases of, <http://www.proquest.umi.com>, <http://www.emeralinsight.com>, <http://scholar.google.com>, <http://www.sciforma.com>, and <http://www.maxwideman.com>. A theoretical model indicating the generic reasons for project failure was developed. Reviewing the articles and highlighting prominent themes within the articles achieved this. A list of the articles reviewed and the themes highlighted is contained in the Concept Matrix (Appendix B).

This chapter begins with an introduction to the research project, section 2.1. Section 2.2 describes the practice of project management, and section 2.3 will define the meaning of project success. Section 2.4 will evaluate the eight common reasons for project failure. The theory developed in this section is based on the review of the articles and the themes

highlighted during the literature review. Section 2.5 will document the research objectives and in section 2.6, the conclusion drawn from the literature review will be presented.

2.2 Project Management

“It is the best to do things systematically, since we are only human and disorder is our worst enemy” –Hesold (8th Century - cited by Bourke (2001).

A project is a temporary endeavour undertaken to achieve a particular aim. Project management knowledge and practices are best described in terms of their component processes. These processes can be placed into five Process Groups: Initiating, Planning, Executing, Controlling and Closing, (PMBOK, 2004). Project management is a practice that is conducted by project management professionals. In the view of the Project Management Institute (PMI) a non-profit organisation based in North America, project management is defined as, “the application of knowledge, skills, tools, and techniques to project activities to meet project requirements,” (PMBOK, 2004).

Wikipedia.org, the online Encyclopaedia, describes project management as the discipline of organizing and managing resources in a manner that these resources deliver all the work required to complete a project within defined scope, time and cost constraints. A project is a temporary and one-time endeavour undertaken to create a unique product or service. Project management exhibiting the property of being a temporary and a one-time undertaking, contrasts with processes, or operations, which are permanent or semi-permanent recurring functional work to create the same product or service repeatedly. The management of these two systems is often very different and requires different technical skills and philosophy, therefore this facilitated the development of project management, (www.en.wikipedia.org, 2006).

Milosevic & Srivannaboon (2006) notes that project management is a specialised form of management, similar to other functional strategies; this specialised form of management is practiced to accomplish a series of business goals, strategies, and work tasks within a well-defined schedule and budget.

As described by PMI (PMBOK, 2004), authors Milosevic & Srivannaboon (2006) and the definition of Project Management as defined by Wikipedia, there are many variations for defining projects and project management, however most definitions only integrate or imply

a focus on the uniqueness of the effort and the forced constraints of time, cost, and performance (to scope and/or quality).

The great engineering wonder and construction feats such as the pyramids of Egypt and the great cathedrals of Europe are earliest examples of projects (Keeling, 2000). As project management evolved, practitioners experienced that their discipline was limited to specific uses in highly technical or scientific applications within specific industries, such as construction, engineering, and defence, (Cicmil, 1997).

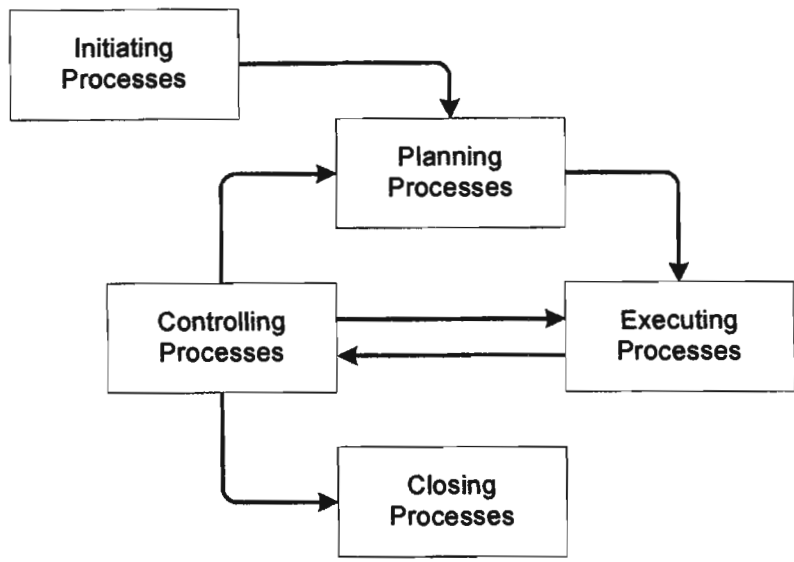
Cicmil (1997) *cites* Loo (1996) and Hebert (2002) who states that professional project management, as studied and practised today, was developed during the 1950s and 1960s through the large and costly United States (U.S.) Defence Department contracts such as the Polaris Missile and Submarine Programs and the National Aeronautics and Space Administration (NASA) Apollo space program.

Project management continues to grow as a profession practised through a wide range of projects (both large and small). The Project Management Body of Knowledge (PMBOK) has revised and expanded it into nine knowledge areas and employers are increasingly encouraging their managers to gain professional project management certification, (Bourke, 2001).

PMBOK Guide (2004) notes that project management offers a structured approach to managing projects. As a project grows in size and complexity, the ability to plan and control them has become a key in the project management function. Projects have by tradition been managed through a classic functional hierarchical type of organisational structure, but with the increase of multi-disciplines, multi departments, multi-companies and multi-national projects, there has been a tendency towards management by projects, (PMBOK Guide, 2004).

Project management is accomplished through the application and integration of the project management processes of initiating, planning, executing, monitoring and controlling, and closing. Figure 2.2.1 depicts the typical project management process as defined by PMBOK Guide, (2000).

Figure 2.2.1 - Project Management Processes (PMBOK Guide, 2000)



2.2.1 Initiating Process Group

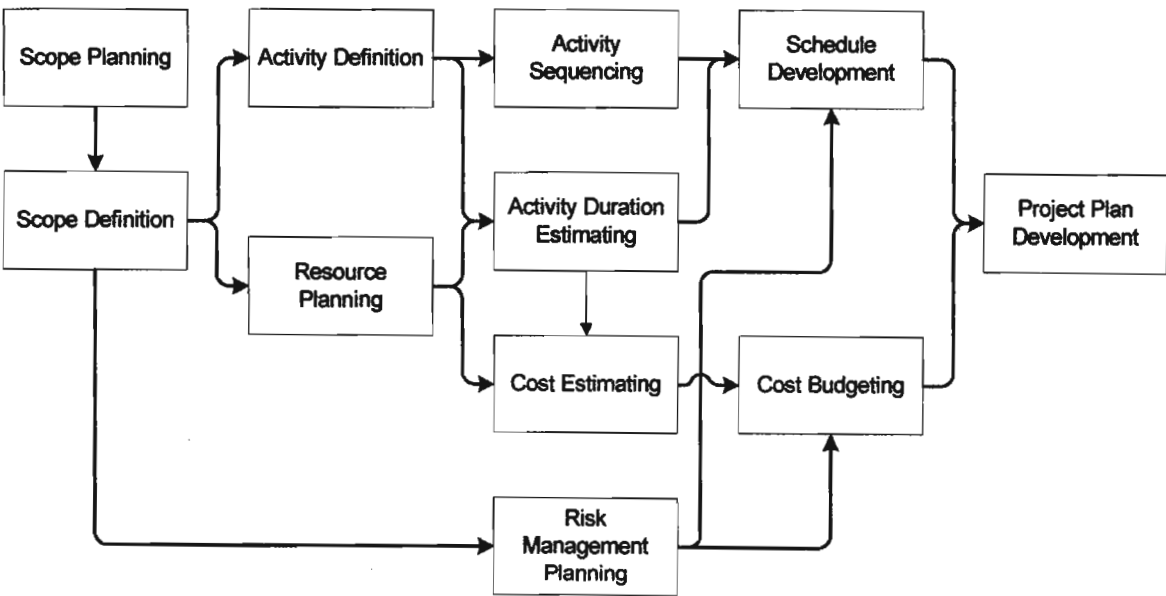
The initiation process group is usually the authorisation of the beginning of a new project and fundamentally starts with the definition of the scope of the project. The objective of this process is to take the ideas and intentions of the group of people who see the need for the project in their organisation and translate it into a formal planned, resourced and funded project. This is done in a way that clearly and explicitly defines the objective of the project and develops an overall schedule of activities and resources (project plan) required to accomplish the whole project. It also defines a project organisation structure that can be used to effectively manage and perform the necessary work and gains commitment and approval from the appropriate senior level management, so that the project is firmly set up for successes, (PMBOK Guide, 2000 & 2004).

2.2.2 Planning Process Group

The Planning Process Group facilitates project planning across multiple processes, the typical planning processes are depicted in figure 2.2.2. Planning is of foremost importance to a project and is an ongoing process throughout the life of a project. Project planning refers to all facets of the development of a project plan, and does not consist of scheduling only, (PMBOK Guide, 2000 & 2004).

The planning process group helps assemble information from many sources relevant to the project to develop the project management plan. These processes also identify, define and mature the project scope, the project cost and project schedule. As new information becomes available additional dependencies, requirements, risks, opportunities, assumptions and constraints will be recognised and resolved. The project management plan developed from the output from the planning process has an emphasis on exploring all the characteristics of scope, technology, risks, resources and cost. Significant changes occurring throughout the project life can prompt a need to revisit one or more of the planning processes and possibly the initiating processes. The progressive updating of the project management plan is often referred to “rolling wave planning” which indicates that planning is an iterative and ongoing process, (PMBOK Guide, 2000 & 2004).

Figure 2.2.2 - Planning Processes (PMBOK Guide 2000)



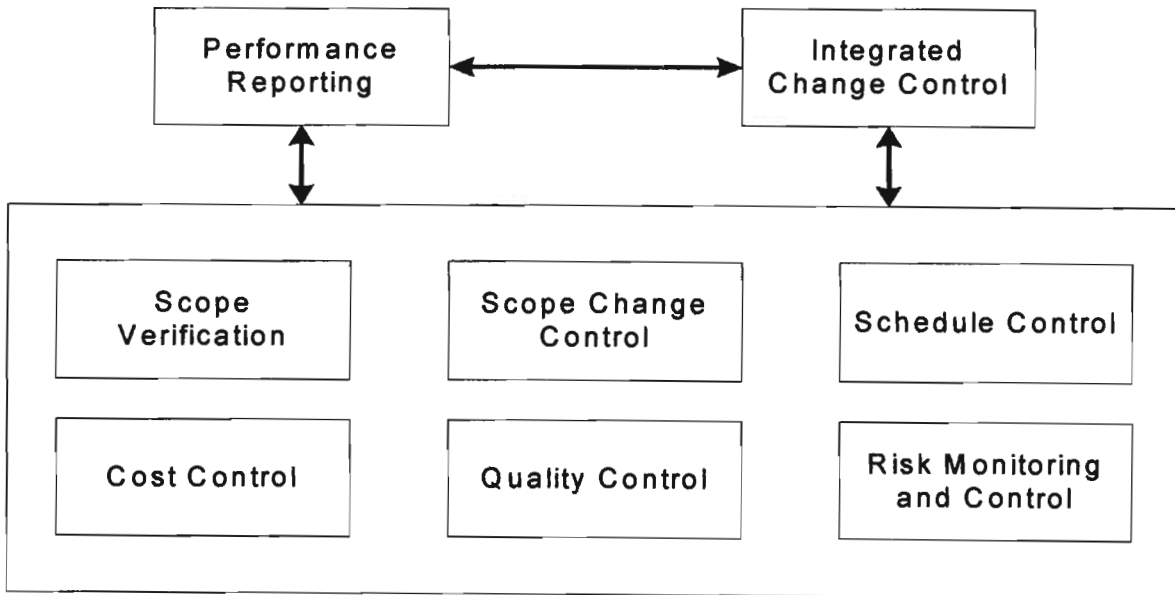
2.2.3 Executing Process Group

Execution is about implementing the project plan by performing the activities contained therein to accomplish the project requirements. This process group involves the co-ordinating of people and resources as well as integrating and performing the activities of the project in compliance to the project management plan. Any variances in the execution of the project management plan will lead to re-planning and analysis of the variance. The bulk of the project budget is expended in performing the processes within the Executing Process Group, (PMBOK Guide, 2004).

2.2.4 Monitoring and Control Process Group

The Monitoring and Control Process Groups consist of those processes performed to monitor project execution so that impending problems can be identified in a timely manner and corrective action can be taken when necessary. The controlling processes include the regular monitoring and measurement of project performance to recognise and deal with variances from the project management plan. The constant monitoring provides the project team insight into the health of the project and highlights any areas that require additional attention. This process group also monitors and controls the total project effort. Figure 2.2.3 depicts some of the process interactions that are vital to this Process Group, (PMBOK Guide, 2000 & 2004).

Figure 2.2.3 - Monitoring and Control Processes (PMBOK Guide, 2000)



2.2.5 Closing Processes Group

The Closing process group includes all the processes to formally finish all the activities of the project. The closure is the formal completion of the project, including the resolution of any open items. The administrative closure process includes the evaluation of the project, including the project review and compilation of lessons learnt.

Wideman (2001) notes that even more basic to the term project management is the term project itself; a project has some distinctive characteristics of its own. Wideman (2001) also defines a project as, “any assignment, which will end when a goal is reached.”

PMBOK Guide (2000) describes a project as, “a temporary endeavour undertaken to create a unique product or service. Temporary means that every project has a definite beginning and a definite end. Unique means that the product or service is different in some distinctive way from all other products or services”, (PMBOK Guide, 2000).

Kerzner (1994) on the other hand explains that a project can be considered any series of activities and task that have certain objectives to be completed with certain specifications. Kerzner (1994) explains further that projects have defined start and end dates, have funding limits and consume resources (money, people and equipment).

Project Management is therefore, “the art of directing and coordinating human and material resources throughout the life of the project by using modern management techniques to achieve predetermine objectives of scope, cost, time, quality and participant (shareholder) satisfaction,” (PMBOK Guide, 2000). Particular attention is given to the word “satisfaction.” The Project Management Institute believes this to be the key ingredient of a successful project. Therefore, a successful project is one where all the stakeholders feel happy about the result, (PMBOK Guide, 2000).

ISO 10006 (1997); a quality management standard that is implemented throughout the world defines a project as, “a unique process, consisting of a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective conforming to specific requirements, including the constraints of time, cost and resources.”

As cited by many authors and professionals (explained above) there are many variations for defining project management and projects, however most definitions only include or entail a focus on the distinctiveness of the endeavour and the imposed constraints of time, cost, and performance (to scope and/or quality). Therefore, it is common for people to use the term project management and projects interchangeably.

Quarterman (1999) explains that organisations embark on projects with the intent of producing a goal or output such as the design of a new product or plant. Projects are generally unique, as opposed to the ongoing work of, say, an accounting department. They have a definitive beginning and end. They have constraints of time, resources, and output performance - what Quarterman refers to as the triple-constraint. For example, project X must produce the design for a new towing tractor that meets certain performance specifications,

within ten months, and cost no more than \$510,000 (Quaterman 1999). Quaterman (1999) is actually referring to the project management parameters depicted by PMBOK Guide (2000), as depicted in Figure 2.2.4. below. These parameters are used as a framework for completing projects effectively, efficiently and consistently, whilst also establishing the foundations for the management, (PMBOK Guide, 2000).

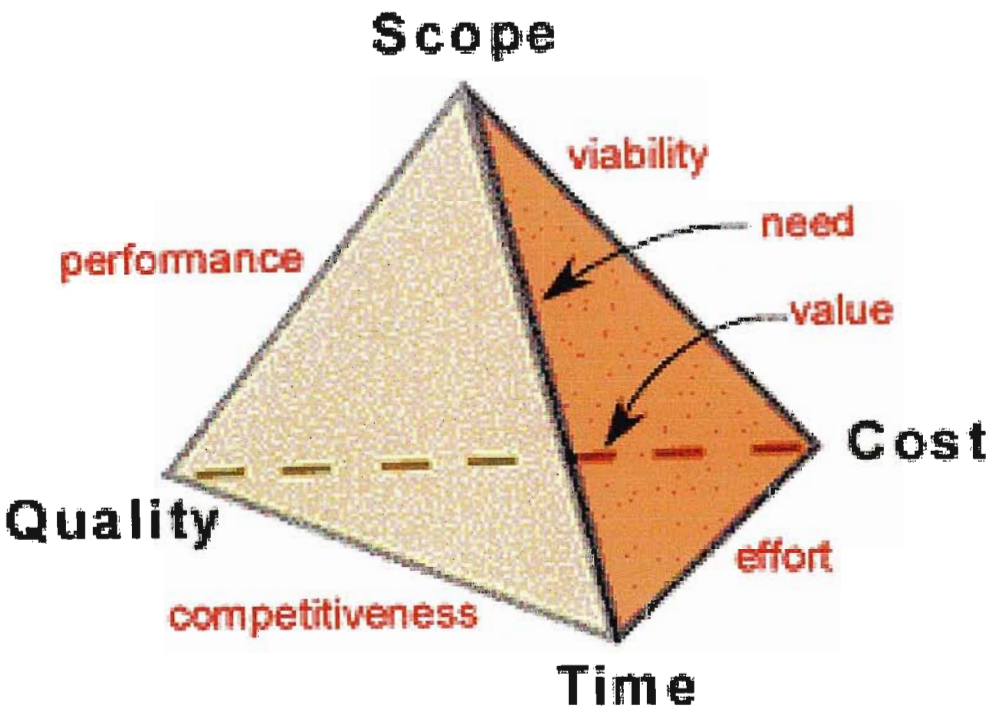


Figure 2.2.4 – Project Management Parameters (PMBOK Guide, 2003)

Like any human undertaking, projects need to be performed and delivered under certain constraints. Traditionally, these constraints have been listed as: scope, time, and cost. This triple constraint is also referred to as the Project Management Triangle where each side represents a constraint. The one side of the triangle cannot be changed without affecting the others. A further refinement of the constraints separates product 'quality' or 'performance' from scope, and turns quality into a fourth constraint, (PMBOK, 2004).

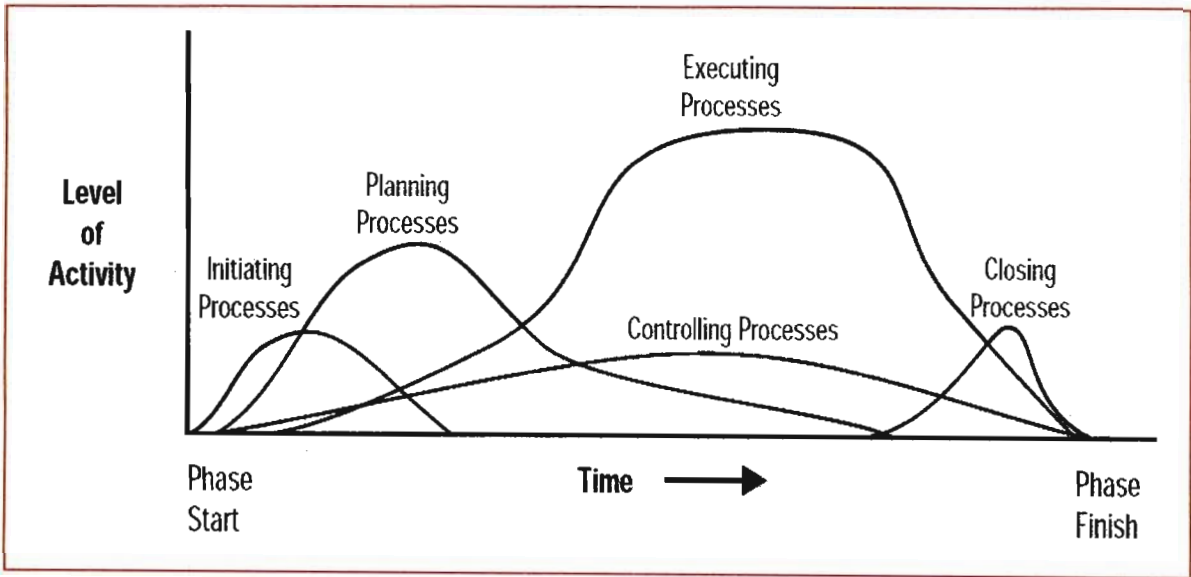
Wikipedia.org explains that the time constraint refers to the amount of time available to complete a project. The cost constraint refers to the budgeted amount (money) accessible for the project. The scope constraint refers to what must be done to generate the project's end-result. These three constraints are often competing constraints: increased scope typically means increased time and increased cost, a tight time constraint could mean increased costs

and reduced scope, and a tight budget could mean increased time and reduced scope, (www.en.wikipedia.org, 2006).

The practice of project management is about providing the tools and techniques that facilitate the project team (not just the project manager) to organise their work to meet the constraints of scope, time, cost and quality. The project scope is the requirements specified for the end-result therefore it encompasses all the constraints. The scope gives the overall definition of what the project is supposed to achieve and a precise description of what the end-result should be or should accomplish. A major component of scope is the quality of the final product. The amount of time put into individual tasks determines the overall quality of the project. Some tasks may require a given amount of time to complete adequately, but given more time it could be completed exceptionally, (www.en.wikipedia.org, 2006).

Projects are therefore divided into phases to provide better management control with appropriate links to the ongoing operations of the organisation. Collectively, these phases are known as the project life cycle (COSAD 001-80-601, 2004). The generic project life cycle typically consists of a number of overlapping processes as shown in Figure 2.2.5 and as explained previously in this section. The details of the project activities depend on the nature of the project and the project deliverables, (COSAD 001-80-601, 2004).

Figure 2.2.5 – Generic Project Life cycle (PMBOK Guide, 2003)



Projects are normally subdivided into a number of sub-projects covering the main aspects of the deliverables e.g. missile development, launcher development, building construction etc. Projects are frequently divided into components or subprojects that are more manageable, though they can be referred to as projects and managed as such. For example a missile development project, depending on the size and complexity of the project may be subdivided into sub-projects such as guidance unit, propulsion and integration (COSAD 001-80-601, 2004). In large sub-projects there may be a second level of sub-projects, e.g., Seeker head, servo or autopilot. An experienced, full time project manager can be appointed to manage each project, this hold true for sub-projects as well. The project manager for both projects and sub-projects is responsible for schedule, cost, technical performance management and risk management in accordance to the project /sub-project management plan, (COSAD 001-80-601, 2004).

Shenhara & Wideman (2000) explains that a project is not merely a “temporary endeavour” or an activity that might start and finish under the responsibility of a project manager; it is a purposeful effort intended to attain a result. Shenhara & Wideman (2000) states that better way of defining it would be, “a unique set of coordinated activities, with definite starting and finishing points undertaken by an individual or an organisation to meet specific objectives within an specified time, cost and performance parameters.” Shenhara & Wideman (2000) also add to this definition, which should include it is only complete when the deliverables have been produced to the satisfaction of the stakeholders. The definition implies that a “project” involves a process of, organisation and control. This is quite distinct from the “product” that is a resulting output. Project management is then the effective management of a process, the output of which is a “product” and if the product meets the satisfaction of the stakeholders then the project is considered successful, (Shenhara & Wideman, 2000).

2.3 Project Success

Baccarini (1999) comments that the definition of project success is open to the perceptions of authors and professionals in the field of Project Management. Baccarini (1999) explains that project success has many different meanings to different individuals; it is like asking the following question to a group men “What makes a woman beautiful?” The response you bound to receive will be based on the individual’s perception of beauty.

The Project Management Institute (PMI) devoted its 1986 Annual Seminars and Symposium to the topic “Defining project success is a difficult task” this reflects the importance of the concept of and the perception of project success, (Baccarini, 1999).

Liu & Walker (1998) explains that project success is a topic that though frequently discussed is rarely agreed upon. Liu & Walker (1998) recommends all role players have to agree to the success criteria for projects during the project initiation phase to avoid team members embarking on achieving other criteria that they believe will lead to the success of the project. Liu & Walker (1998) comments that this will leave room for perception and will ultimately jeopardise the successful outcome. Project success has remained ambiguously defined concept, it is a concept that has a multitude of different meaning to different people because of varying perceptions and this leads to disagreements about whether a project is successful or not, (Liu & Walker, 1998).

Baccarini (1999) and Shenhar & Wideman (2000) identify two distinct components of project success. The two components are as follows: 1) Project management success focuses upon the project process and in particular, the successful accomplishment of cost, time, and quality objectives. It also considers the manner in which the Project Management Process is conducted. 2) Product success deals with the effects of the project's final product.

Baccarini (1999) notes that it is common for project management literature to confusingly entwine these two separate components of project success and present them as a single homogenous group. Baccarini (1999) goes on to explain that in order to properly define and assess project success, a distinction needs to be made between product success and project management success, as they are not the same.

Shenhar *et al* (1997) explains that theoretically, the determination of project management success disregards product success, example, a project is managed efficiently but eventually does not meet customer or organisational expectations. Shenhar *et al* (1997) cites Wateridge (1998) who states that the focus of project managers is on project management success. This is highlighted by research conducted by himself on IT projects, whereby project managers interpreted a failed project as one not meeting budget and schedule, while users placed greater importance on the meeting of requirements, such as response times and reliability, which is a product attribute. The above research by Wateridge (1998), indicates that project

managers focus on the short-term criteria relating to the project 'process' and concentrate on meeting time and budget constraints as opposed to the longer-term criteria relating to the "product," such as delivering an Information Technology System with which the users are satisfied, (Shenhar *et al*, 1997).

One can argue that outcomes of any project management process is a 'product' tangible or intangible therefore product success is a direct manifestation of the controlling, monitoring and measurement of the project management process. This then implies that product success is a direct result of the project management process (Shenhar & Wideman, 2000). The Project Management Institute states "The manager and the project team are responsible for determining what processes from the Process Groups will be employed, by whom, and the degree of rigor that will be applied to the execution of those processes to achieve the desired project objective", (PMBOK, 2004).

Kessler (2001) explains that successful project management requires a careful, unique mix of technical understanding, project management basics, team building expertise, and organisational dynamics with excessive amounts of tenacity, drive, optimism, creativity and perseverance. Given the melange of skills required and the interdependencies of processes within the context of project management, it is not to be unexpected that many project managers fail to deliver their projects, on time, within budget and the correct level of product quality, (Kessler, 2001).

In 1994, the Standish International Group studied 365 companies with a total of 8,380 Information's System applications under development. The Standish Group's "CHAOS" Report contains data on project failure and success rates, but added to this it contains indicators for success and failure. The "CHAOS" Report divides the projects into three categories, which are called resolutions. (www.standishgroup.com, 2006)

Resolution Type 1 is a Project Success – the project is completed on time and budget, with all features and functions as specified (16.2% of projects fell in this category).

Resolution Type 2 is Project Challenged – projects were completed, but exceeded costs and time and lacked all of the features and functions that were originally specified (52.7% of projects fell in this category).

Resolution Type 3 is named Project Impaired/Fail – these projects were abandoned or cancelled at a point and therefore became total losses (31.1% fell in this category.)

Deducing from the definition of project management highlighted in the preceding sections and the Standish Group “CHAOS” report, a successful project must be on time, on budget and deliver quality (features and functions) as specified any thing less will be a challenged project or a failed project.

The concerning conclusion from the “CHAOS” report is that only 16,2% was successful by all measures and 70% of projects were not successful. Over 52% were partial failures and 31% were total failures, (www.standishgroup.com, 2006).

In addition to the Standish Group Chaos Report, in 2004, Price Waterhouse Coopers (PWC) established that only a handful of projects initiated ever achieve success. Its survey focused on a broad range of industries, large and small, in 30 different countries - 10,640 projects, for a total value of \$7.2 billion. The study found that only 2.5 % of global businesses achieve 100 % project success, (Kessler, 2001).

Kessler, (2001) states that project success can therefore be defined as, a project that is on schedule (on time), within the agreed budget (cost) and deliverables meeting and exceeding the user requirements (quality). Kessler, (2001) comments “that after evaluating the statistics made available from the Standish Group and Price Waterhouse Cooper, it is clear for a project manager embarking on a new project, the road ahead is going to be bumpy, it is going to be an extremely difficult journey especially if the odds are stacked against you to achieve success.”

After gaining sufficient information and an understanding of project success and the alarming failure rate of projects as described by the Standish International Group “CHAOS” report, it is important to understand the reasons for project failure. The next section describes the common and generic reasons for project failure as highlighted in the articles contained in Appendix – B written by authors describing their experiences and project management professionals. The results of the themes highlighted after the literature review is documented in Appendix - B (Concept Matrix). The themes highlighted from the literature review, explain reasons for project failure over a multitude of dissimilar projects. Taking into consideration that most projects irrespective of type, the functional area and the industry they

are executed in, are typically subjected to the same process groups as defined by PMBOK (2003). For example, a project executed with the Information Technology Industry will have the same project management “process map” to that of a technical project being executed within the Defence Industry. It is the opinion of the researcher that the Project Management Institute would have published the Project Management Body of Knowledge (PMBOK) Guide tailored for a specific industry, for example a PMBOK Guide for the medical industry, a PMBOK Guide for the construction industry *et cetera*. Therefore, the themes discussed in section 2.4, are not exhaustive and the sole reasons for projects failing, they have been highlighted due to the frequency of prominence in the articles reviewed.

2.4 Themes

Successful project management requires a carefully tailored blend of technical understanding, team building expertise, public relation know how, political intellect and project management basics combined with excessive perseverance, optimism, creativity and energy. It is not surprising therefore that many projects managers fail to deliver their projects on time, on budget and at the right quality (features and functions) that were originally specified, (Kessler, 2001).

There are many reasons for project failure. For example Hoffman (2003) informs us that project managers too frequently act as “process cops and report compilers and lose sight of what they’re supposed to be doing – to make sure projects are running effectively. Martyn & Hulme, (2003) *cites* Kessler, (2001) who notes that “MIS projects and associated procurements take place in an environment characterized by the following: Lack of management continuity and an incentive system that encourages overly optimistic estimates of the benefits that can be attained from doing the project.” Kessler, (2001) *cites* Brown (2001) who notes poor management, under funding and under-resourcing are to blame for the failure of the majority of workplace projects. Kessler, (2001) *cites* Wittaker, (1999) who states that the three most common reasons for project failure are poor project planning, a weak business case, and a lack of top management involvement and support.

It can be deduced from the above that many authors and writers quote different reasons for project failure. This is based on the type of industry the writer is exposed to, experiences on past projects and area of project interest. This research looks objectively at the generic reasons for project failure. After reviewing forty-four articles (Appendix - B), twelve generic

themes/reasons for project failure surfaced based on the prominence in the articles. Only eight of the twelve themes are discussed in the following section. The reason for this is based on the overlap between the themes and looking at the likelihood of occurrence in all projects.

It is envisaged that in identifying factors that contribute to project failure and measuring any “failed project” against these factors, the majority of the reasons for project failure will fall within the list of eight highlighted in the next subsection.

2.4.1 Inaccurate Project Estimation – (Project Pre Planning)

In order for a project to be effectively planned and controlled, accurate estimating is essential for establishing a budget to control the cost associated with the project. The person estimating the budget for the project needs to predict all the project’s parameters by building a model of the project on paper. The quality and accuracy of the estimate should be seen as the best approximation based on time available to complete estimation, information available, techniques employed in doing the estimation and expertise and experience of person conducting the estimate, (Bourke, 2001).

The quality and the accuracy of the estimate should be continually improved as the project progressively evolves as more information that is accurate becomes available. The estimate should be precise, accurate and must make provisions for all planned eventualities because the estimator or the person submitting a quotation will financially and contractually commit the organisation at the tender stage. Therefore, during the tender phase it is important that the estimation is accurate enough to limit the exposure of the organisation. The estimation usually focuses on the financial dimension of the project, it is important to note that costs can only be accurately established until the other factors such as scope; time, resources, material and equipment have been quantified, (Bourke, 2001).

Guttman & Longman ((2006) *cites* McLaughlin (2005) who states that huge weapons systems being developed for the Pentagon and a Government Accountability Office review of 26 weapons systems found the total cost of these programs had increased nearly 15% over the first full-cost estimates. Guttman & Longman ((2006) explains that is clear from the above statement by McLaughlin (2005) that accurate estimation during the pre-planning phase of the project is of vital importance for a project to be a success. As explained earlier in the chapter there are many perceptions regarding the success criteria for projects. If project

cost escalates beyond the initial estimation, the organisation, namely management, could consider this project to be a failure due to it not achieving the profit margins as intended initially. The project may be completed at a loss to the company; resources could be tied up on the project that could be utilised on projects that are more profitable, (Guttman & Longman, 2006).

Douglas (2004) uses the case study of the Construction Industry Institute (CII). He explains that the Construction Industry Institute (CII) chartered a team to determine the effect of pre-project planning on the success of projects. This CII Pre-Project Planning Research Team conducted a detailed study of 62 capital-facility construction projects to determine how the effort expended on pre-project planning affected the success of the projects. Analysis of the data collected indicated that pre project planning is vital to project success and should be adopted as a best practice by corporate business organisations that perform Capital Facility Construction projects, (Douglas, 2004).

The CII study published in 1994 reported that the pre-project planning level of effort directly affects the cost and schedule predictability of the project. Using four significant variables of Budget, Schedule, Design Capacity and Plant Utilization, the CII team had compared the project's success to the project authorization estimate. As the level of pre-project planning increased, the average project cost performance favourably decreased by as much as 20 percent, the average schedule performance decreased (improved) by as much as 39 percent. Similarly, plant design capacity attained and facility utilization improved by about 15 percent. In addition, the project scope changes decreased as the level of pre-project planning effort increases, (Douglas, 2004).

Douglas (2004) concludes from the CII case study, that there is a positive, quantifiable relationship between effort expended during the pre-project planning/estimation phase and the ultimate success of a project. The probability that a project will meet or exceed its (cost and schedule) goals increased as the level of effort in pre-project planning increased, (Douglas, 2004).

The theme highlighted in this section; that of inaccurate cost estimation in the pre-planning phase of the project is considered an important factor that contributes to project failure if not estimated accurately.

2.4.2 Incomplete User Requirements (Project Scope)

Mr Smith, general manager of the project management division at Business Connexion, states that given the worrying statistics available on project failure and the billions of dollars companies spend each year on projects, it is imperative that companies understand the reasons behind project failure. He notes that there are numerous reasons for projects failing, ranging from incomplete project requirements and specifications to lack of user input, (www.bussinessconnexion.co.za, 2006).

Smith makes mention in his report online, that incomplete requirements and specifications accounted for 9.33% of project failures, changing requirements and specifications accounted for about 8.96% of failures, and the lack of user input and unclear objectives each accounted for 8% for Information Technology Software Projects failing in South Africa, (www.bussinessconnexion.co.za, 2006).

The Standish Group, 1995, "*CHAOS Report*", reports that projects get into trouble due to incomplete user requirements. The Standish Group "*CHAOS report*" shows conclusively from the results obtained from the survey, that problems arise when a company engages its users to elicit and manage a comprehensive set of requirements. Projects become "challenged." And the likelihood for this happening is due to a incomplete requirement problem, (www.standishgroup.com, 2006).

Lindquist (2005) explains that user requirements are of prime importance to the successful outcome of a project. Lindquist (2005) states that the following principle holds true: the person or end-user of a product will have the most valuable input into the design of a product. Lindquist (2005) also explains that the cost of ignoring the end-user early upfront in a project can have costly consequences. Furthermore one needs to provide the end-user with a solution that they are part of. The concept of specific products being foreign to the needs of the user needs to be avoided because there is a natural tendency for the user to show reluctance in accepting or embracing a solution they were not part of. Not being able to finalise user requirements early in the process translates to errors being factored into the project. Mistakes made early in the project due to incomplete user requirement gets more difficult to resolve as the project progresses, (Lindquist, 2005).

Neimat & Taimour (2005) notes that one has to beware of '**scope creep**' when defining user input and project requirements. '**Scope creep**' is the name given to the constant changing of the original project specification. Stick to the specifications as it is important to note, that the tendency for a user wanting more than initially planned and budgeted for is extremely high, which has damaging consequences to the cost, schedule, quality and risks associated with the project, (Neimat & Taimour, 2005).

The scope of a project is defined by the user requirement, the Project Management Body of Knowledge (PMBOK, 1996), defines scope management as the process required to ensure that the project includes all the direct work required, to complete the project successfully.

Wideman (1990) explains that, when managing project scope one has to take cognisance of defining and controlling what is or what is not included in the project, to meet the projects goals and objectives specifically, that of the project sponsors' and stakeholders.' Wideman (1990) notes that project scope management consists of authorisation, scope planning, scope definition, scope change management and scope verification. PMBOK (2004) defines scope as "the work that needs to be accomplished to deliver a product, service or result with the specified features or functions."

An important principle to understand is that the outcome of any project is a product; this product is specifically designed to meet a user requirement. Therefore, a primary factor in defining the scope of any project would be determined by user requirements. Secondary to this is the organisational goals and objectives that need to be taken into consideration when performing the project, (Baccarini, 1999).

The theme highlighted in this section places emphasis on project failure due to incomplete user requirements. A statement by Chin (2003) highlights this theme, "nothing kills projects faster than giving users something they did not ask for and then pretending they did."

2.4.3 Poor Project Planning

Project planning lays the foundation for project management success. The quality of the planning and time invested in project planning enables project managers to derive useful information for making decisions to achieve the product quality, time and budget goals associated with the project. Due to poor project planning, project manager's are restricted in

applying any analytical process to evaluate the status and the success of a project. The quality of the output is dependent on the inputs at the beginning of the project. Therefore, the planning stage for any project needs significant attention, (Ertl, 2003).

During the planning phase of the project, it is the project manager's responsibility to coordinate the contributions of the project participants to meet or exceed the stakeholders' needs and expectations. The project manager is ultimately responsible for integrating all the objectives and goals of the project and to ensure it is achieved in the project, (Bourke, 2001).

PMBOK (1996) defines project integration management as the process required to ensure that the various elements of the project are properly co-ordinated. The project planning effort must be coordinated with the key project planning team members to facilitate the development of a plan containing details about how everyone will work and communicate with each other, in order to ensure a clear understanding of how they will contribute to the future success of the project, (PMBOK, 1996).

A project plan is the documentation of the project planning efforts. The Project Implementation Plan (PIP) is a definitive document regarding the project scope, schedule and cost that is implemented through the project's functional plans and procedures: safety and health, environmental, engineering, procurement, construction, quality control, project controls, and automation, (Baker & Baker, 1992).

Douglas (2004) explains that effective project planning begins and ends with the efforts of the project team. Douglas (2004) goes on to note that the quality of information contained in the project plan and how well the project team has developed the project plan contributes to the success or failure of the project.

Shenhar *et al.* (2003) explains that the project schedule is one of many project management tools used to measure progress against the overall project plan. Shenhar *et al.* (2003) describes that there are any number of reasons that projects do not complete as scheduled and too often, the blame is placed on the project schedule. Shenhar *et al.* (2003) elucidates that in reality, the project was not properly planned and subsequently this caused the project plan to be flawed and "interpreted" into a schedule to fit the project's required completion date.

To manage a project successfully Shenhar *et al.* (2003), distinguishes three levels of project planning that need to be incorporated in the project plan, they are as follows:

- End-user Level – Planning focuses mainly on the functional characteristics of the project's end product.
- Technical Level – the team that has to create the product, focuses on the technical specifications of the product deliverables needed to support the functional requirements.
- Project Management Level – the focus is on planning the activities and processes that need to be carried out in order to allow for the technical work to proceed effectively.

It is of utmost importance that project managers understand the different levels of project planning when embarking on a project. To manage a project successfully a project manager needs to plan typically to the three levels distinguished by Shenhar *et al.* (2003) for the planning to be effective.

The theme highlighted in this section focuses on the effectiveness of project planning and the different levels of project planning. Project planning begins and ends with the efforts of the project team. How well the project team has developed the project plan contributes to the success or failure of the project.

2.4.4 Inadequate Project Staffing and Human Resources

Project managers face challenges with every project, in trying to execute the task to meet the required quality standards, within the minimum possible time, cost and resources. Inadequate Project Staffing and Human resources is a topic that covers many areas and contains a myriad of interrelated subjects. A project may not have the right level of resources because of incorrect work estimation. Contrary to this is that the work estimation is correct, but management has not allocated the proper level of staffing. It is also possible that people with the right 'skills mix' are not available. All of these may attribute to major project failures, (Mochal, 2005).

Tuman (1986) notes that for projects to be successful, the project manager needs to anticipate all project requirements, have sufficient resources to meet project needs in a timely manner, and must use these resources efficiently to accomplish the right task at the right time and in the right manner.

The firms of Guttman Development Strategies, Kepner-Tregoe and Quality Progress conducted a survey on project team performance in September 2005. Quality Progress e-mailed the survey on project team performance to about half its readership. Of the 46,828 people who received the survey, 1,905 responded, for a 4% response rate. Twenty-nine % of respondents were individual contributors, 42% were first-line and middle managers, and 15% were senior managers. Respondents represented a cross section of industries. Approximately half worked for companies with more than \$200 million in revenue and 1,000 employees. Quality Progress began by probing five areas vital to an organisation's project success; one of the probe areas was that of Resource and Staffing. More than two-thirds of respondents said their organisations' project teams 'are only sometimes, rarely or never' given sufficient resources to accomplish their goals. Insufficient resources was most common answer to the open-ended question asked on "what is the most common reason for the failure of projects in your organisation?" More than half the respondents did not think that the right people 'were always or often selected' to lead or serve on project teams, (Longman & Guttman, 2006).

Longman & Guttman (2006) explains that the topic of inadequate project human resources and staffing has spurred many debates and caused discord amongst project practitioners, project team members and management. The responses of the 2005 Quality Progress Survey affirms the comments made by Longman & Guttman (2006) .

Ives (2005) argues that organisational conflict for human resources can be attributed to many issues within the project environment, from inadequate staffing, lack of competent employees, misalignment of organisational goals and priorities and other organisational influences. Ives (2005) describes that the jostling to secure human resources resembles the sport of "tug-o-war" where each project manager sets his or her project above the rest (ranking their project as highest priority) in the organisation. In doing so, he or she demands that the best competent resources are redirected to his/her project to ensure project success.

Cook (1999) explains, that generally, organisations have a single resource pool and organisations utilise the expertise and skills from this resource pool to perform multiple tasks on different projects. Cook (1999) notes that many organisations overcome this challenge by introducing a Project Office to coordinate all tasks and allocate resources to the relevant projects. Cook (1999) cautions that, if organisations have not embraced a project structure and a project management culture even by introducing a Project Office, it is found that

projects will still be inadequately staffed because project priorities will not be aligned with organisational goals.

The topic highlighted in this section is that of Inadequate Human Resources and Staffing. It is important to note from the literature reviewed, a reason for projects failure is due to inadequate human resource and staffing. For an organisation to ensure project success, it needs to make available to the project manager, human resources with adequate skills and competencies to meet the objectives of the project.

2.4.5 Inadequate Risk Management

Risk management, as defined by the Project Body of Knowledge PMBOK (1996) includes the processes concerned with conducting risk management planning, identification, analysis responses and monitoring and control on a project.

Project Management Consulting Institute has published the risk review model as displayed in figure 2.4.1 below. It is important to understand that project risk management spans across the functional areas of project management. The management of risks on a project is interrelated between all the functional areas in the project; hence, it must be managed collectively, (PMBOK 2004).

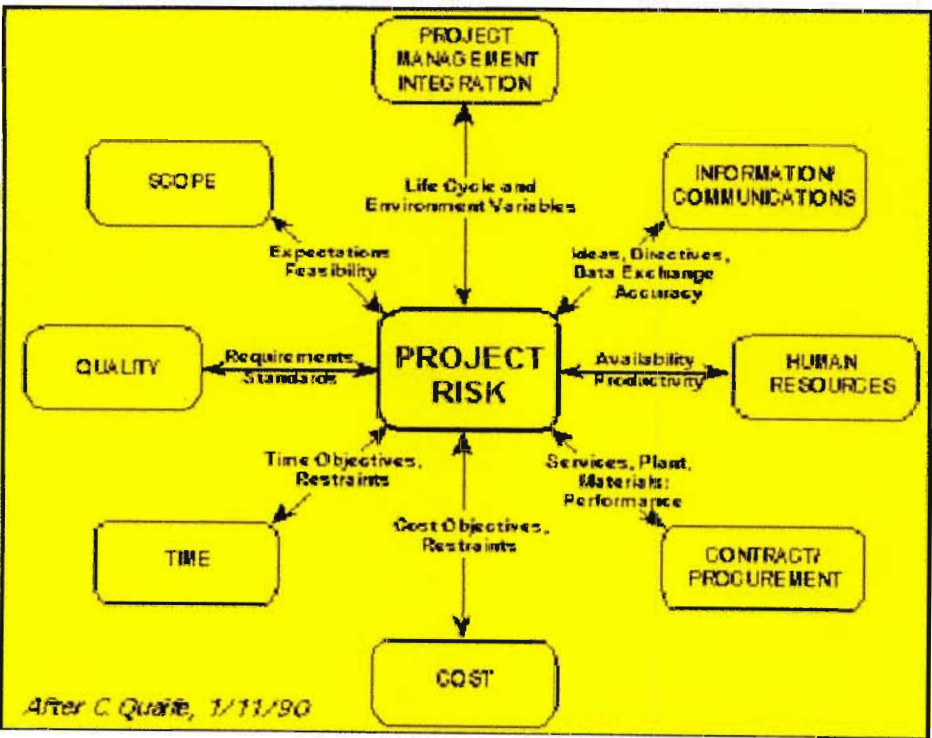


Figure 2.4.1 – Project Risk Wheel (Project Management Consulting, AEW Services, 2003)

Royer (2000) classifies risks into two classes, that is, recognisable risks and unmanaged assumptions. Royer (2000) explains that recognisable risks are those that can be identified during planning and engagement of contracting activities, for the most part, they are highly visible and immediately apparent to everyone (or at least someone) involved with the project. Typical examples include new technology, financial resource constraints, staff resource limitations, changes to business process. Mitigation strategies are often available for these kinds of risks, (Royer, 2000).

Assumptions are risks that cannot be predefined, here it becomes difficult to mitigate or set in contingency plans. An example is natural environmental forces namely rain, wind, snow that can cause havoc to a construction project especially if you have to abide by the strict end dates. Project managers normally make provisions for some uncertainties, mostly financial provisions however planning to mitigate this class of risk is difficult especially if the uncertainties cannot be quantified, (Royer, 2000).

There are vast majority of tools and application of processes stressed by PMBOK and PMI, that are directed to reducing risks and removing their impact on the project (e.g. Work Breakdown Structures, lessons learnt, resources allocation, risk analysis). Royer (2000) states that it is imperative that for any project to be successful, project teams need to drift away from risk avoidance and start managing risks proactively. It is impossible to mitigate every eventuality regarding risks. Equally dangerous is avoidance. One needs to establish a balance, as risk mitigation strategies and contingency plans cost money; it takes up time and involves resources. It would be wise for project managers to make a provision within the project budgets to factor a percentage of their project cost for the management of risks, (Royer, 2000).

Royer, (2000) mentions that Project Managers agree that risk management is of vital concern to them, as unmanaged or unmitigated risks leads to project failure. Royer, (2000) goes on to explain that if you know about a problem, you can plan to overcome it and more often than not, the results will be positive. It is without mitigation strategies, contingency plans and the avoidance of risks on a project that introduces chaos and failure into an otherwise well-planned and managed project, (Royer, 2000).

Once the risks are identified, it should be prioritised and risks mitigation plans should be implemented. A contingency plan should be included and coupled to a decision point to invoke the plan; this could be the result of a measurement, an output from an event in the project *et cetera*, (Royer, 2000).

The theme highlighted in this section is Inadequate Risk Management. It is important to note for projects to be successful it requires adequate management of risks namely that one needs to reduce the impact on the project within the constraints of time, money, stakeholder requirements. It is also understood from the literature reviewed that it is highly improbable that every risk would manifest itself and every contingency plan will be activated on a project, (www.bussinessconnexion.co.za, 2006).

2.4.6 Project Manager's Poor Interpersonal Skills

Kendra & Taplin (2004) reviewed literature on Project Management Success Factors, and then developed a four-dimensional (2×2) success model based on socio-technical system design concepts of Eijnatten (1993) and Pasmore (1988). The project success model encompasses micro- and macro-organisational design elements, representing social and technical aspects of Project Management, and defines the social and technical factors at the micro (individual) and macro (group) levels of Project Management, (Kendra & Taplin, 2004).

Kendra & Taplin (2004) also explains that the social dimensions of project success are specific to the individual organisational members (people) who perform project-related work. These individuals include a project manager and project team members. Success factors are associated with the social dimensions of organisation design and include the micro-social element of project manager skills and competencies, and the macro-social element of project organisational design structures, (Kendra & Taplin, 2004).

Project managers' interpersonal skill falls within the ambit of the micro-social dimension of project success defined at the individual project manager level and are the same interpersonal skills and competencies that are employed by project managers to lead projects, (Baccarini, 1999).

Chin (2003) explains that organisations often fall prey to one of the most unfortunate and entirely preventable causes of project failure; the human factor. Chin, (2003) elucidates that

companies tend to forget that project management is about organizing people and therefore its impact on a project's outcome is unmistakable but often overlooked.

Peled (2000) suggests that the technical skills and tools associated with project processes are not likely to lead to project success. Rather, success is determined by the project manager's skills in organisational politics, which are often the secret weapon for achieving the desired outcome.

Bigelow (2000) writes, "that some say best project managers' exhibit extraordinary energy levels, phenomenal political skills, and an absolute obsession with results." Bigelow (2000) also describes that in a study conducted by the Benchmarking Forum of the top 500-project management companies, the Benchmarking Forum identified attributes of best practice by project managers. The best practice Project Managers according to the Benchmarking Forum study has the following attributes:

- Exhibits evidence of strong desire for goal achievement
- Are recognised by stake holders as the single most important factor in projects goal achievement
- Are even tempered
- Are truthful in all dealings and relationships
- Exhibit eagerness to organize and lead groups
- Have confidence their personal performance will result in positive outcome
- Have faith that the future will have a positive outcome

Ives (2005) suggests that the success of project is shaped by the project manager's personality; Bigelow (2000) also notes that on review of recent articles that highlights projects success, there appears to be some common thread woven into the personalities of successful project managers. The personalities of successful project manager as described by Bigelow (2000) include the following:

- Team Building Skills – ability to coach your team and be a role model
- Clear Vision – ability to create, nature and communicate the vision
- Communication Skills – knowing when and how to communicate
- Interpersonal Skills – listening to and the ability to empower others
- Committed – ability to meet commitments e.g. project goals
- Work pleasure – embracing the challenges within the project.

- Structure and Alignment – creating the environment and leading project teams to success.

The theme highlighted in this section is that of the Lack of Project Manager's interpersonal skills. It must be mentioned that projects are a social undertaking; the capability of a project manager to negotiate, communicate, influence and persuade others to do things is indispensable. Effective project managers competently organize the cooperation and assistance of other people towards the accomplishment of project goals and objectives. Lacking finely honed interpersonal skills required for managing people within the project environment is a sure recipe for project failure, (Ralph & Kliem, 1991).

2.4.7 Lack Project Culture – Organisational Influences

To understand the lack of project culture better, one needs to bring it into the context of Project Management, as expressed previously (maybe not implicitly) in preceding section of this chapter. Project management encompasses the following dimensions:

- Project Phases and Project Lifecycle
- Project Stakeholders
- Organisational Influences
- Key Management Skills
- Socioeconomic influences

Organisational Influences - Projects are typically part of an organisation that is larger than the project. The maturity of an organisation with respect to project management system, culture, style, organisational structure and project management office can influence the project, (PMBOK, 1996).

Cook (1999) explains that most organisations are generally vertical bureaucracies. Nonetheless, project management cuts across these vertical structures placing the authority and accountability for the required project results in the hand of the project manager. It is argued by Cook (1999) that project management shifts the power from existing hierarchies within organisations to a conducive, success orientated cross-functional organisation requires an organisational culture change, (Cook, 1999).

Taplin & Kendra (2004) discusses that Cummings and Worley (1997) view organisational culture as part of the overall organisational design. They define culture as "a means to

promote coordination of a variety of tasks, serve as a method for socializing and developing people, and establish methods for moving information around the organisation".

McNamara (1999) postulates that organisational culture is the personality of the organisation and notes that many Organisations develop unique and describable cultures, which reflects in numerous factors including but not limited to the following:

- Policies and Procedures
- Work ethics and behaviours
- View of Authority Relationships within the organisation
- Shared Values, norms, beliefs and expectations

Culture is a term that is difficult to define specifically, but everyone in the organisation identifies culture when it is discussed. For example, the culture of a large corporation is quite different in a country's Armed forces, compared to that of a hospital. One can assess the culture of an organisation by looking at the behaviours of the employees, the arrangement of furniture, the working hours and attire of employees, etc. It is similar to describing the personality of an individual, (McNamara, 1999).

Cook (1999) explains that when adopting a project culture, the organisation needs to establish a new set of behaviours. This change process needs to start with the senior management of the organisation. In a project culture based organisation, the functional manager provides resources to the project team, the project manager must be fully empowered, via the project charter, to make decisions, deal directly with stakeholders and secure the require resources that is required on the project. Executive management must create a project management methodology that defines the project life cycle and associated processes. Standardisation is required through a complete set of instructions (company operating procedures), templates, forms, and other tools (e.g. Microsoft Projects) to ensure repeatable performance across the organisation. A training programme will be necessary to teach and reinforce the use of new project methodology to all employees. Executive managers need to lead by example through consistent application of the project methodology and reward successful project behaviour, (Cook, 1999).

Kendra & Taplin (2004) state, "For organisations to be successful with the adoption of project management, they need to establish a shared set of values and beliefs (a project

management culture) that aligns with the social and technical aspects of project management to achieve the organisation's business objectives.”

The theme Lack of Project Culture is highlighted in this section. It is important to understand an organisation's need to fully adopt a project culture for project management, to improve cost, product quality, technical performance and schedule. This will inevitably lead to stakeholder satisfaction. Due to the lack of fully adopting a project culture within the organisation, projects are prone to failure, (Cook, 1999).

2.4.8 Lack of Senior Management Support

Dorsey (2000) argues that in every study ever done about system success or failure top management support has been identified as a critical factor. Without full commitment from top management, when problems arise on a project (as they inevitably do), the project will collapse, (Dorsey, 2000).

Kappelman *et al.* (2006) states, “It is not surprising that this is the top-rated early warning signs because employees tend to focus on activities that their management deems important.” Kapelman *et al.* (2006) also notes that potentially problematic projects include those that get started "from the bottom up" and departmental projects that do not have the required support from across the enterprise. In many cases, IT projects are caught up in enterprise politics where there are fundamental disagreements about overall enterprise priorities. In these cases the resources and enterprise wide commitment required for success are lacking. Middle managers do not see the project as being important to the enterprise or to their performance evaluations and therefore redirect resources and attention to activities that top management does support, (Kappelman *et al.*, 2006).

Dinsmore & McElroy (1996) indicates that most executives focus on foundation values and search for ways to measure and increase the return on their organisations' investments and reduce expenditure. At times, executives do this without recognizing the compounding effects and co-dependencies of their actions on failed and successful projects alike. As a result, when projects fail, so can executive support for the project and the project management discipline as a whole, (Dinsmore & McElroy, 1996).

Crawford (2002) explains that for a project to be successful, it is important for top management to support the project in its entirety. Project managers require adequate resources to ensure that they are in a favourable position to meet the requirements and deliverables of the project. They must have the cooperation of people from the other areas of the organisation, they need timely approval by top management of unique project needs and they require the assistance of management to help with leadership issues. For the project to be successful, the project manager needs the support of top management to deal with issues of organisational influences and to motivate project team members when projects become challenges, (Crawford, 2002).

It is important to note for any Change Management Process, System Implementation and other business improvement processes to be successful, top management support and commitment is key to success. The International Standards Organisation, ISO 1006:1997, states “top management shall provide evidence of commitment to the development of and implementation of a quality management system.” To motivate the statement above, it is important to note that even the International Standards Organisation has realised the importance of top management support, so much so it is included as a requirement in the standards.

The theme highlighted in this section is Lack of Management Support. According to KPMG's (1997) survey of more than 1,400 organisations, the lack of top management commitment was a key factor in failed projects. Clearly, this statistic by KPMG is a cause for concern and it indicates a direct relationship between lack of top management commitment and project failure.

2.5 Aim of the Study

The objectives of the study formulated after the literature review and to answer the question posed by Mr Tsepo Monaheng: General Manager Denel UAVS are:

- 1) To evaluate the effect the current project management process practiced within Denel UAVS has on project success.
- 2) To evaluate the effect of size and complexity of projects executed within Denel UAVS has on project success.
- 3) To establish the most important interpersonal skills required by project managers, within Denel UAVS for project success.

- 4) To evaluate the influence the current organisational structure within Denel UAVS has on project success.

2.6 Conclusion

Articles were gathered by narrowing the searches on databases and search engines using the keywords such as project failure, project success, project management and project performance. Forty-four articles were chosen pertaining to the subject of project failure, project success and project management, the articles were reviewed and listed in the Concept Matrix contained in Appendix–B of this document. Twelve most common themes surfaced during the literature review; out of the twelve themes, eight were chosen for discussion, due to the frequency and prominence of the said subject matter, being cited in the literature. The professional practise of project management was brought into context and a theory was formulated in section 2.3 and section 2.4.

From the literature that was reviewed, it can be concluded that project success can therefore be defined as, ‘a project that is on schedule (on time), within the agreed budget (cost) and the deliverables meet and / or exceed the stakeholders requirements (quality).’ It is also postulated that the eight most common reasons for project failure are:

- Inaccurate Project Estimation
- Incomplete User Requirements
- Poor Project Planning
- Inadequate Project Staffing and Human Resources
- Inadequate Risk Management
- Project Manager’s Poor Interpersonal Skills
- Lack of Project Culture and Lack of Senior management Support

The theory developed by this research aims to consolidate the many perceptions by project management professionals and authors pertaining to project success and reasons for project failure. It also provides a basis for managing projects so the outcomes will be successful. It is envisaged by the researcher that project management professionals and projects managers managing projects for the first time could use the theory from this research to establish a framework to measure and ensure that the projects they manage results in a successful project.

In chapter 3 – Research Methodology, a questionnaire will be prepared with the elements of the theory developed to understand, why projects executed within Denel Aerospace Systems do not achieve objectives as set out at the beginning of the project.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction on research methodology

After reviewing the literature and formulating the research objectives in chapter 2, this chapter focuses on the practical task of gathering data within Denel UAVS. To meet the research objectives formulated in the previous chapter, it is essential to design a research methodology, which will be applied systematically in the ensuing effort satisfy the aim of the study.

The formulated objectives and the aim of the study after the literature review are:

- 1) To evaluate the effect the current project management process practiced within Denel UAVS has on project success.
- 2) To evaluate the effect of size and complexity of projects executed within Denel UAVS has on project success.
- 3) To establish the most important interpersonal skills required by project managers, within Denel UAVS for project success.
- 4) To evaluate the influence the current organisational structure within Denel UAVS has on project success.

Information on research methodology was gathered through the medium of the Word Wide Web (Internet), business research textbooks, article, lecture notes and journals.

The subsequent sections of this chapter will contain discussions on the types of data to be obtained from the research, the use of the Likert Scale, the method selected for the collection of data (i.e. the questionnaire), type and choice of questions used in the questionnaire, the process utilised to substantiate the use of the research questionnaire, the survey population and the determined sample size and the handling of data collected.

3.2 Data Types

3.2.1 Primary and Secondary Data

Data can be classified from a primary or a secondary source. Primary data refers to information that is developed or gathered by the researcher specifically for the research project at hand, (www.en.wikibooks.org, 2006). Typical sources of primary data include, questionnaires, interviews, research data, letters and speeches, (Lubbe & Kloppe, 2005).

Alternatively, data that has already been collected for some other purpose, perhaps analysed, processed and subsequently stored is referred to as secondary data, (www.en.wikibooks.org, 2006).

Saunders *et al.* (2003) state that secondary data include both quantitative and qualitative data, and can be used for both descriptive and explanatory research. Saunders *et al.* (2003) also explains that there are three main sub-groups of secondary data, namely documentary data, survey-based data, and those compiled from multiple sources. Documentary data include, information that can be sourced from, books, journals, websites of organisations and newspaper articles, (Saunders *et al.*, 2003). The literature reviewed in chapter 2 therefore falls with the ambit of secondary data more specifically documentary data.

3.2.2 Qualitative and Quantitative Data

Watkin (2003) states that apart from the student's exposure to environment within which the research is being conducted and the academic reading the student undertakes prior to attempting the research, there are further factors that impact on the choice of field of study and this is to determine if the research would be of a qualitative or quantitative nature.

Saunders *et al.* (2003) mentions that many authors (e.g. Easterby-Smith *et al.*, 2002 & Bryman, 1988) try to distinguish between qualitative and quantitative research. Saunders *et al.* (2003), also go on to cite Silverman (1993), who concludes that attempts to define qualitative research, in the manner that it is differentiated from quantitative research, can be very difficult.

Watkin (2003), explains that there are four possible ways to gather quantitative data, namely: interviews, questionnaires, test and measures and observations, Watkin (2003), also explains that lesser known methods from which quantitative data is collected include: archives and

database. Watkin (2003), also state that the most fundamental of all qualitative methods of collecting data is that of in-depth interviewing and the lesser known qualitative methods data is collected from are: group interviews, cognitive mapping, protocol analysis, projective techniques, repertory grid technique and the critical incident technique. Wakins (2003), concludes that there is much overlap between qualitative and quantitative method of obtaining data.

Saunders *et al.* (2003), explains that significant distinctions between these two types of data exists. The distinctions contained in the table below, which was formulated by themselves using Dey (1993), Healey and Rawlinson (1994), as reference and their very own experiences:

Table 3.2.1 Distinctions between quantitative and qualitative data

Quantitative Data	Qualitative Data
Based on meanings derived from numbers	Based on meanings expressed through words
Collection results in numerical standardised data	Collection results in non-standardised data requiring classification into categories
Analysis conducted through the use of diagrams and statistics	Analysis conducted through the use of conceptualisation

Source: Saunders *et al.* (2003)

Saunders *et al.* (2003), explains that quantitative data can be classified into data types using a hierarchy of measurement, often in an ascending order of precision, and cite Diamantopoulos and Schlegelmilch (1997), and Morris (1999) pertaining to this topic. Saunders *et al.* (2003) further states that these different levels of numerical measurement will dictate the range of techniques available for the presentation, summary and analysis of the data.

Saunders *et al.* (2003) state that quantitative data can be classified into two distinct groups: categorical and quantifiable. Categorical data refers to data where values cannot be measured numerically but can be classified into sets (categories) according to characteristics in which you are interested or placed in rank order. Categorical data is further subdivided into

descriptive and ranked data. A car manufacturer might categorise the car it produces into descriptive categories such as hatchback, saloon or estate (Saunders *et al.*, 2003). Ranked (or ordinal) data are more precise, in such instances the definite position of each case within your data set is known, (Saunders *et al.*, 2003).

Quantifiable data are values that can actually be measured and quantities can be assigned. This means that quantifiable data is more precise than the categorical data because you can assign each data value a position on a numerical scale, (Saunders *et al.*, 2003).

Quantifiable data is broken down into two sub-groups, namely continuous and discrete (Saunders *et al.*, 2003). Continuous data as stated by Morris (1999) and *cited* by Saunders *et al.* (2003) are data with values that can theoretically take any value (sometimes within a restricted range) provided that accurate means are available to measure them. In contrast, discrete data can be measured precisely, where each case takes one of a finite number of values from a scale that measures change in discrete units (Saunders *et al.*, 2003). These data are often whole numbers (integers) such as the number of mobile phone manufacturers or customers served, however in some instances discrete data will include non-integer values, for example shoe sizes, (Saunders *et al.*, 2003).

Saunders *et al.* (2003) explains that when one moves from descriptive categorical data to discrete quantifiable data, increased precision in measurement is possible, and the more precise the level of measurement, the greater the range of analytical techniques available.

3.3 The Use of Likert Scale in Questionnaire Design

Bucci (2003) explains that as early as 1967 and *cites* Tittle *et al* (1967) who quotes, “the Likert Scale is the most widely used method of scaling in the social sciences today.” Bucci (2003) also states that this is due to it being much easier to construct and because it tends to be more reliable than other scales with the same number of items.

A Likert scale is a type of psychometric response scale often used in questionnaires and is the most widely used scale in survey research. When responding to a Likert questionnaire item, respondents specify their level of agreement to a statement. The scale is named after Rensis Likert, who published a report describing its use, (www.en.wikipedia.org, 2006). Leading

from the discussions above and referencing Watkins (2003), the Likert scale is therefore a means of gathering quantitative data.

Welman & Kruger (2001) state the summated or Likert scale was introduced by Likert (1903 – 1981), and *cites* Kidder and Judd (1986) who states that it is currently the most popular type of scale in the social sciences. Welman and Kruger (2001) state that the Likert scale may be used for multi-dimensional attitudes, which is not possible with other attitude scales.

Bucci (2003) explains that the Likert Scale requires the respondent to make a decision on their level of agreement, generally on a five-point scale (i.e. Strongly Agree, Agree, Disagree, Strongly Disagree) with a statement. The number beside each response becomes the value for that response and the total score is obtained by adding the values for each response, hence the reason why they are also called 'summated scales' (the respondents score is found by summing the number of responses). Bucci (2003) *cites* Dumas (1999), who suggests, ' this is the most commonly used question format for assessing participants' opinions of usability'.

Welman & Kruger (2001) describes that a summated attitude scale consists of a 'collection of statements about the attitudinal object', and subjects have to indicate the degree to which they agree or disagree with each statement on, for example, a five-point scale such as 'strongly differ', 'differ', 'undecided', 'agree' and 'strongly agree'.

Figure 3.3.1 - Example of Likert Scale used in a Questionnaire (Bucci, 2003)

Likert Scales

Please fill in the number that represents how you feel about the computer software you have been using

I am satisfied with it

1

2

3

4

5

Strongly Agree

Agree

Neither

Disagree

Strongly Disagree

It is simple to use

1

2

3

4

5

Strongly Agree

Agree

Neither

Disagree

Strongly Disagree

It is fun to use

1

2

3

4

5

Strongly Agree

Agree

Neither

Disagree

Strongly Disagree

It does everything I would expect it to do

1

2

3

4

5

Strongly Agree

Agree

Neither

Disagree

Strongly Disagree

I don't notice any inconsistencies as I use it

1

2

3

4

5

Strongly Agree

Agree

Neither

Disagree

Strongly Disagree

Welman & Kruger (2001) explain that an attitude scale should contain approximately the same number of positively and negatively formulated items to counteract 'acquiescent response cycle' (i.e. where research participants tend to consistently answer 'yes' to yes/no items or 'true' to true/false items, irrespective of the content of the question). Mogey (1999) states that a typical question using a Likert scale might pose a statement and ask the respondent whether they 'Strongly Agree', 'Agree', are 'Undecided', 'Disagree' or 'Strongly Disagree'.

Mogey (1999) describes that the researcher can code the responses obtained, for example, (1 for 'Strongly Agree', 2 for 'Agree', 3 for 'Neither', 4 for 'Disagree' and 5 for 'Strongly Disagree'). Mogey (1999) further explains that the response of 'Agree' (coded as 2 points) and 'Undecided' (coded as 3 points) cannot be averaged to give two and a half points. Mogey (1999) then states that the data collected are ordinal, i.e. they have an inherent sequence. Therefore, it cannot be assumed that the respondent means that the difference between 'Agreeing' and 'Strongly Agreeing' is the same as 'Agreeing' and 'Undecided'

Saunders *et al.* (2003) find that although a Likert scale may usually comprise a four, five, six or seven point rating scale, they *cite* Dillman (2000) who explains, that if the intention is to use a number of statements then the same order of response categories should be maintained to avoid confusing respondents.

Bucci (2003) explains that it is possible that some respondents may be neutral in answering the questions. In this case it can be argued that by not including a neutral point in a scale, the respondent is compelled to make a decision. Saunders *et al.* (2003) state that by using an even number of points, it is possible to exclude a neutral option on the scale such as 'neither' and thereby force the respondent to express their feelings. Bucci (2003) explains that arguments exist for including and not including a neutral point on the Likert Scale (example 'Neither' on the 5 point scale describe above) and it would be reasonable to ask what effect adding a neutral point and not having a neutral point has on the responses you receive.

Bucci (2003) *cites* Kahn *et al.* (2000) who explains that the traditional idea suggests that the qualitative results between the two scales (i.e. one with and one without a neutral point) are unaffected. Therefore, the respondents are truly neutral; they will randomly choose one or the other. Forcing them to choose should not bias the overall results.

Bucci (2003) notes the following disadvantages and advantages of using the Likert Scale in the survey design (refer to table 3.3.1).

Advantages	Disadvantages
Simple to construct	Lack of reproducibility
Each item of equal value so that respondents are scored rather than items	Absence of one-dimensionality or homogeneity
Likely to produce a highly reliable scale	Validity may be difficult to demonstrate
Easy to read and complete	

Table 3.3.1 – Advantages & Disadvantages of Likert Scale used in Survey Design (Bucci, 2003)

Saunders *et al.* (2003) explains that there are other types of rating scales, which include ‘numeric rating scales’ and ‘semantic differential rating scales’. In a numeric rating scale, a respondent is asked to rate their feelings on a scale between two extremes (e.g. poor value for money and good value for money.) When there are no descriptions given for the points in between, the respondent uses the number to express his feelings in response to the question, see figure below as example, (Saunders *et al.*, 2003).

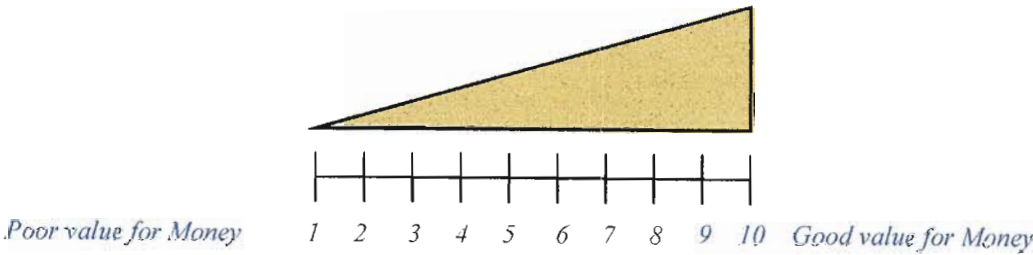


Figure 3.3.2 - Numeric Rating Scale, Saunders *et al.* (2003)

Bucci (2003) explains that the semantic differential rating scale is concerned with the ‘measurement of meaning’; the idea or association that individuals attach to words or objects. Bucci (2003) goes on to explain that respondents are required to mark on a scale between two opposing opinions (bipolar adjectives) the position they feel the object holds on that scale for them. Bucci (2003) *cites* Osgood *et al.*, (1957) who notes that the three main factors that

emerge from semantic ratings are: the evaluative factor (good-bad, pleasant-unpleasant, kind-cruel); the potency factor (strong-weak, thick-thin, hard-soft); the activity factor (active-passive, slow-fast, hot-cold).

Rating scales have been combined to measure a wide variety of concepts such as customer loyalty, service quality and job satisfaction. For each concept, the resultant measure or scale is represented by a scale score created by combining the scores for each of the rating questions, (Saunders *et al.* 2003).

3.4 Data collection method

3.4.1 Collecting primary data

In primary data collection, the researcher collects the data themselves using methods such as interviews and questionnaires. The key point here is that the data the researcher collects is unique to the researcher and the research project and until the research is published, no one else has access to it, (www.brent.tvu.ac.uk, 2006).

Saunders *et al.* (2003) state that primary data can be gathered using a number of techniques, such as observation (participant or structured), semi-structured and in-depth interviews and questionnaires.

Participant observation is qualitative. It involves the researcher participating fully in the lives and activities of subjects and focuses on the meanings that people attach to their actions, while structured observation is quantitative, more detached and is more concerned with the frequency of those actions, (Saunders *et al.*, 2003).

Interviews can be either formal or informal. During informal or structured interviews, a prepared or standardised schedule or questionnaire is used to obtain quantitative data. Conversely, informal or unstructured interviews are used to probe in-depth questions in the pursuit to obtain qualitative data. Unstructured interviews can also be used to clarify certain quantitative data obtained by self-administered questionnaires, (Babbie, 1998).

Table 3.4.1 indicates the uses of the different types of interviews in each of the main research categories:

Interview Type	Research Category		
	Exploratory	Descriptive	Explanatory
Structured		**	*
Semi-structured	*		**
In-depth	**		

Table 3.4.1 – Type of Interviews for different Research Categories

Key: ** = more frequently used, * = less frequently used

Table 3.4.1 - Uses of different types of interviews in each of the main research categories
(Source: Saunders *et al.*, 2003)

Saunders *et al.* (2003) explain that the different type of interviews as shown in the above table have a different purpose. Saunders *et al.* (2003) explains further that structured or standardised interviews can be used in survey research to gather data, which would then be the subject of quantitative analysis, while semi-structured and in-depth (or non-standardised) interviews are used in qualitative research in order to conduct discussions not only to reveal the ‘what’ and the ‘how’ but also to place more emphasis on exploring the ‘why’.

When conducting descriptive research studies, structured interviews (i.e. using questionnaires) can be used as a means to identify general patterns, (Saunders *et al.*, 2003).

3.4.2 Use of Questionnaires

Leedy (1997) explains that questionnaires are a common instrument for observing data beyond the reach of the observer. Saunders *et al.* (2003) note that the greatest use of questionnaires is made by the survey strategy. The use of the questionnaire as the instrument for gathering data has the advantage of consistency; because each respondent is requested to respond to, the same set of questions and it ensures an efficient way of collecting responses from a large sample, (Saunders *et al.*, 2003).

Robson (2002) *cited by* Saunders *et al.* (2003), explains that questionnaires work best with standardised questions that the researcher is confident will be interpreted in the same way by all respondents.

Therefore according to Saunders *et al.* (2003), questionnaires can be used for descriptive or explanatory research; where descriptive research (such as that undertaken using attitude and opinion questionnaires) will enable the researcher to identify and describe the variability in different phenomena, while explanatory or analytical research will enable the researcher to examine and explain relationships between variables, in particular cause-and-effect relationships.

Saunders *et al.* (2003) state that questionnaires can be either of the self-administered type, or interviewer administered type. Self-administered questionnaires can be administered online, through the post or delivered to and collected from respondents, while interviewer administered questionnaires can take the form of either telephonic questionnaires or structured interviews. Saunders *et al.* (2003) further explains that the choice amongst these types of questionnaires will depend on a variety of factors related to the research question(s) and objective(s).

Saunders *et al.* (2003) states that the choice of questionnaire will be affected by the resources the researcher has available, and in particular (1) time available to complete the data collection; (2) financial implications of the data collection and entry; (3) availability of interviewers and field workers to assist; and (4) ease of automating data entry.

Watkins (2003) notes that the self-administered questionnaire is a quantitative technique for collecting data and is generally acknowledged as the most popular technique for surveying the opinions and attitudes of individuals. Watkins (2003), also indicates that the self-administered questionnaire comprises of a written set of questions to be personally completed by the respondents. It is usually accompanied by general information on what is expected from the respondents as well as a set of instructions to the respondents on how to complete the questionnaire.

The questionnaire in the survey research has both advantages and disadvantages. One of the advantages of a questionnaire is that the respondents have sufficient time to think about the answers posed in the questionnaire. Another advantage is that the researcher can send

questionnaires to respondents distributed over a large geographical area. The completion rate of questionnaires seems to be higher than straightforward mail survey, when the researcher delivers or pick ups the questionnaires personally, or both, (Babbie, 1998).

Babbie (1998) explains that the disadvantages of a questionnaire are as follows: 1) the researcher will not be at hand to explain any uncertainties, which can result in bias and distorted answer, 2) the accuracy and completeness of the of questions are often inadequate, 3) the researcher cannot visually observe the respondents physical reactions.

3.4.3 Types of Variable Collected through Questionnaires.

Questionnaires are usually more versatile than other data collection methods. It can be used to collect more types of information from a wider variety of sources than other method, because questionnaires use people, who can report facts, figures, amounts, statistics, dates attitudes, opinions, experiences, events, assessments and judgements during a single contact, (www.en.wikipedia.org, 2006).

Dillman (2000) *cited by* Saunders *et al.* (2003), distinguishes between three types of variables that can be collected through questionnaires, namely (1) opinion; (2) behaviour; (3) attribute. Opinion variables record how respondents feel about something or what they think or believe is true or false. Saunders *et al.* (2003), explains that when recording what respondents do, the respondents behaviour is also being recorded and behavioural variables contain data on what people (or their organisations) did in the past, are doing now, or will do in future.

In contrast to opinion attribute variables, that contain data about the of respondent's characteristics (Saunders *et al.*, 2003), attributes are best thought of as things a respondent possesses, rather than what a respondent does (Dillman, 2000; *cited by* Saunders *et al.*, 2003). Saunders *et al.* (2003), goes on to explains that attribute variables are used to explore how opinions and behaviour differ between respondents as well as to check that the data collected is representative of the total population and examples of attribute variables include characteristics such as age, gender, marital status, education, occupation and income.

3.4.4 Choice of data collection method

Watkins (2003) and Saunders *et al.* (2003) suggests that researchers can use many techniques for collecting data for the research project, for example direct observations, interviews,

questionnaires and literature reviews. The first step taken to collect data in this research project was in Chapter 2, using the literature review technique. The next technique employed for collecting data, was the use of a self-administered questionnaire with the aim to meet the research objectives developed in Chapter 2. The questionnaire surveyed the attitudes of the employees of Denel UAVS (sample size specifically) with regards to project failure and it attempts to understand the cardinal reasons for project failure within the company.

The use of the questionnaire will allow the collection of quantifiable data and allow for the quantitative analysis of this data to determine patterns and opinions amongst the different groups i.e. senior management, middle management and employees.

In the following sections emphasis will be placed on the development and design of the questionnaire.

3.5 Types of questions

Saunders *et al.* (2003), argue that most types of questionnaires make use of a combination of open and closed questions. Open questions allow respondents to give answers in their own way (Fink, 1995; *cited by* Saunders *et al.*, 2003). This is sometimes referred to as ‘open-ended’ questions (Dillman, 2000; *cited by* Saunders *et al.*, 2003). On the other hand, closed questions provide a number of alternatives from which the respondent is instructed to choose. Closed questions are also sometimes referred to as ‘closed-ended’ questions (Dillman, 2000; *cited by* Saunders *et al.*, 2003) or ‘forced-choice’ questions (deVaus, 2002; *cited by* Saunders *et al.*, 2003).

Saunders *et al.* (2003) *cite* Youngman (1996; *cited by* Bell, 1999) who identifies six types of closed questions, namely (1) ‘list’, where the respondent is offered a list of items, any of which may be selected; (2) ‘category’, where only one response can be selected from a given set of categories; (3) ‘ranking’, where the respondent is asked to place something in order; (4) ‘scale or rating’, in which a rating device is used to record responses; (5) ‘quantity’, to which the response is a number giving the amount; and (6) ‘grid’, where responses to two or more questions can be recorded using the same matrix. The Likert Scale (discussed earlier) can be used for the fourth type of closed question given above, (Saunders *et al.*, 2003).

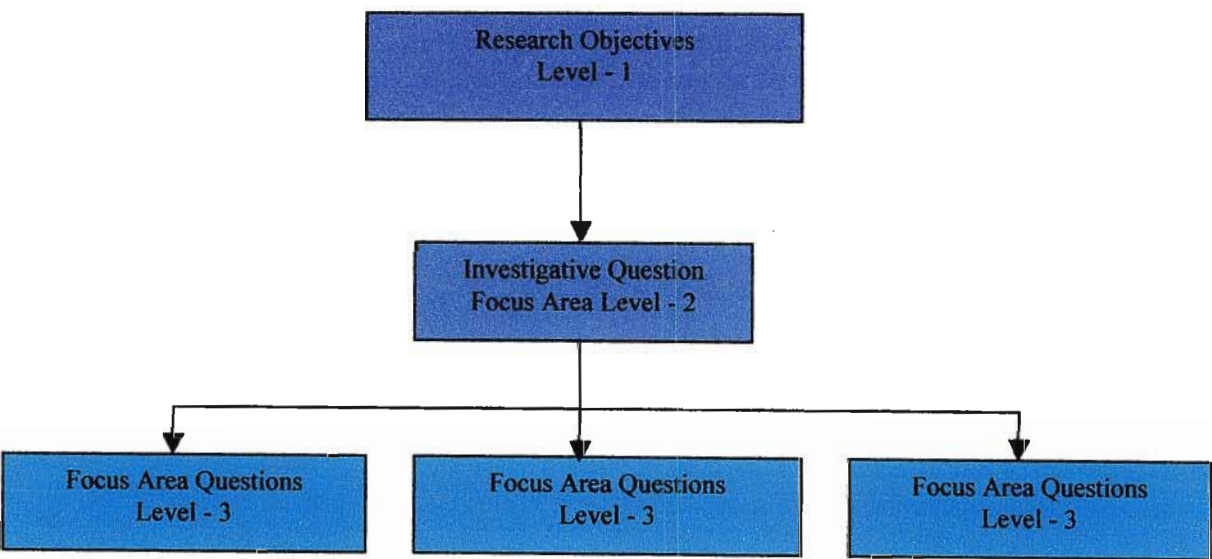
3.5.1 Developing the questionnaire

Chapter 2 was concluded with the following research objectives still to be met:

- 1) To evaluate the effect the current project management process practiced within Denel UAVS has on project success.
- 2) To evaluate the effect of size and complexity of projects executed within Denel UAVS has on project success.
- 3) To establish the most important interpersonal skills required by project managers, within Denel UAVS for project success.
- 4) To evaluate the influence the current organisational structure within Denel UAVS has on project success.

Saunders *et al.* (2003) cite Cooper & Schindler (2001) who states that investigative questions are questions that need to be answered in order to address satisfactorily each research question and to meet each objective. The research objectives were broken down using the concept of hierarchy; the typical structure is depicted in the figure below.

Figure 3.5.1 – Research Objectives Hierarchy as incorporated in Questionnaire



A tabular representation of the research objectives hierarchy structure was compiled to depict the coherency of the focus area questions to each research objective. The table also contains the survey variables and the type of questions used at the level 3.

Table 3.5.1 Research questionnaire development

Research Objective Level - 1	Focus Area Level 2	Coherency with Research Objective	Type of Question used at Level - 3	Type of Variable Collected
1. To evaluate the effect the current project management process practiced within Denel UAVS has on project success.	Project Management Process Project initiation Project planning Project execution Project monitoring and control Project closure Project Success and Failure Definition of project success Reason for project failure	1.1 Assessment of Project Management Process within UAVS	1.1 Likert Scale from Strongly Agree to Strongly Disagree, omitting a neutral point forcing respondent to express feeling 1.2 Closed question and open-ended, respondents provided with a number of alternatives and instructed to choose one or to answer in their own way.	1.1 Opinion of employees regarding the project management process within UAVS. 1.2 Opinion of employees regarding their perception of project success and failure.
2. To evaluate the effect of size and complexity of projects executed within Denel UAVS	Characteristics of Projects Executed in UAVS Project size	2.1 Assessment of projects normally undertaken by UAVS	2.1 Scaling/rating question, respondent requested to use a rating scale of Low, Medium or High	2.1 Behavioural and Opinion, recording what employees do within UAVS

has on project success.	Projects normally undertaken by UAVS			
3. To establish the most important interpersonal skills required by project managers, within Denel UAVS for project success.	<p>Project Manager's Skills and Capabilities</p> <p>Project manager's interpersonal skills</p> <p>Project manager's personal traits</p>	3.1 Evaluation of skills and capabilities required for successful execution of projects within UAVS	3.1 Closed question, respondents provided with a number of alternatives and instructed to choose one.	3.1 Opinion of employees regarding their perception of the Skills and Capabilities required by Project Managers.
4. To evaluate the influence the current organisational structure within Denel UAVS has on project success.	<p>Organisational Structure, Roles and responsibilities:</p> <p>Organisational structure type</p> <p>Organisational roles and responsibilities required for project success</p>	4.1 Assessment of the current organisational influences within UAVS.	4.1 Closed question, respondents provided with a number of alternatives and instructed to choose one.	4.1 Opinion of employees regarding their perception of the Organisational Influences on Project Success.

3.5.2 Covering Letter

Saunders *et al.* (2003) argue that most self-administered questionnaires are accompanied by a covering letter, which explains the purpose of the survey, and further state that this is the first part of the questionnaire the respondent should look at.

Research by Dillman (2000), and others, as *cited* by Saunders *et al.* (2003) has shown that the messages contained in the covering letter will affect the response rate. According to Witmer *et al.* (1999) *cited* by Saunders *et al.* (2003), e-mail offers greater control as to who answers the questionnaire because most users read and respond to their own mail at their personal computer.

The covering letter incorporated in an e-mail forwarded to participants of the survey is presented below and is based on some of these findings, as described by Saunders *et al.* (2003).

Good day_(Name of Participant)_

In management's continued efforts in wanting to improve key business processes within Denel UAVS, a study will be conducted within the project management domain of Denel UAVS, to understand why the projects executed within Denel UAVS do not meet the objectives as set out in the beginning of the project. Permission for conducting this survey was granted by Mr. Tsepo Monaheng.

The results of the study will provide UAVS Management with inputs towards the improvement of key business processes and furthermore, this study will be submitted in fulfilment of the requirements of an MBA Degree at the University of KwaZulu Natal.

It would be appreciated if you would kindly complete the attached questionnaire. It will take approximately 15 minutes. Please forward your completed response to me preferably by e-mail or alternatively via internal mail.

Please note there is no correct answer; so do not dwell too long on a question. Please apply your mind and choose the best appropriate option by placing a tick (✓) in the block.

A practical tip for completing the questionnaire is to copy and paste the tick (✓) shown as an example at the top of the document in the appropriate block. If possible I would like your response by Thursday (19/10/2006.)

Thank you in advance for taking the time to complete the questionnaire.

Regards

Abhinash. Raghu

Product Manager: Denel UAVS

Extension: 2661

3.5.3 Introductory Questions

A set of introductory question will be asked to determine if the respondent fits the population being surveyed, as well as establish patterns in responses, for example:

Please indicate your job classification (e.g. Senior Management, Professionally Qualified, Skilled Technical, etc)?

How many years have you been employed by Denel UAVS?

Please indicate your area of project involvement (e.g. Contract Management, Project Management, Engineering, etc)?

3.5.4 Introducing the Questionnaire

Saunders *et al.* (2003) state that at the start of your questionnaire you need to explain clearly and concisely why you want the respondent to complete the survey. Dillman (2000) cited by Saunders *et al.* (2003) argues that, to achieve as high a response rate as possible, this should be done in the first page of the questionnaire in addition to the covering letter. The questionnaires is introduced and presented below based on the recommendations of Dillman (2000) as cited by Saunders *et al.* (2003).

Introduction

The purpose of this questionnaire is to understand why technical projects within Denel UAVS fail to meet the objectives as set out in the beginning of the project. The results obtained from this survey will be communicated to the UAVS Management Team and the results will also be used to promote improvement of the Project Management Process within UAVS. This survey will use the “best practice” project management process as described in the Project Management Body of Knowledge (PMBOK), 2004 edition, as a benchmark for evaluating the project management process within UAVS.

You, being a valued contributor to the project management process within Denel UAVS, are invited to participate in this survey to determine the reasons for Technical Projects failure within Denel UAVS. This Survey will be distributed to randomly selected employees that are directly involved in the Project Management Process within Denel Dynamics UAVS.

Your participation in this study is completely voluntary. There are no foreseeable risks associated with participating, however, if you feel uncomfortable answering any questions, you can withdraw from the survey at any point.

Your survey responses will be strictly confidential and data from this research will be reported only as statistics. Your information will be coded and will remain confidential. At no time will anyone be able to trace your answers back to you. Please devote 15 minutes of your valuable time to the completion of this questionnaire.

If you have questions at any time, about the survey or the procedures, you may contact Abhinash Raghu at 012 – 671 2661 or by email at the address specified email: abhinash.raghu@kentron.co.za

Responses to this survey can be sent back directly to me via e-mail, or alternatively it can be printed and sent to me via internal mail.

3.5.5 Actual Questionnaire for distribution

The actual questionnaire that was distributed to the survey sample is included in Appendix C.

3.6 Validating the Questionnaires

Babbie (1998:159) argues that there is always a possibility of error no matter how carefully a researcher may design his/her questionnaire. According to Welman & Kruger (2001), the surest way of avoiding such errors is to pre-test (conduct a dry run on) the questionnaire on limited number of subjects from the population.

Three weeks before the final document was distributed to the employees of Denel UAVS, a preliminary “draft questionnaire” was administered to two Senior Project Manager within Denel UAVS.

The two Senior Project Managers were requested to comment on, the time required to complete the questionnaire, the understanding of the language being use in the questionnaire, the layout of the questions and to test for ambiguity in the questions. The respondents were given two day to provide the researcher with comments.

The researcher received both preliminary draft questionnaire by the end of the first day, both respondents concurred that an estimated time of 11 minutes is require to complete the questionnaire, therefore when introducing the questionnaire the respondents are requested to devote approximately 15 minutes of their valuable time in completing the questionnaire. The respondents of the preliminary draft suggested that researcher restrict the respondent to choose one option in questions 6,7and 8 respectively. The questionnaire was updated to include an instruction to the respondent to choose ‘one’ of the alternatives, in questions 6,7 and 8, furthermore no other changes were made.

The final draft questionnaire was submitted on 14th November 2006, to the University of Kwa-Zulu for approval by the University’s Ethics Committee.

3.7 Population and sample size

According to Babbie (1998:200) the survey population is defined as the aggregation of elements from which the population is selected. Babbie (1998:200) further explains that the element is that unit about which information is collected and which provides the basis of analysis. Cooper & Emory, (1995) explains that a census study includes all the elements of the population.

Population can also be defined as the total collection of element about which we wish to make some inference (Cooper & Emory, 1995). The population for this study consists of all direct employees within Denel UAVS, for practical reasons the population excludes unskilled employees and indirect staff. "Direct Employees," mean all employees within Denel UAVS that book project hours in execution of a task within the project. The current population size as defined in the Denel UAVS Kenman (2006), is 56 employees (N= 56).

3.7.1 Sample

Saunders *et al.* (2003), states that sampling provides a valid alternative to a census when:

- It would be impractical for you to survey the entire population
- Your budgets constraints prevents you from surveying the entire population
- Your time constraints prevents you from surveying the entire population
- You have collected all the data but need the results quickly

Cooper & Emory, (1995), state that basic idea of sampling is, that by selecting part of the element in the population, conclusions may be made about the entire population.

Saunders *et al.* (2003) state that sampling techniques available can be divided into two types, probability or representative sampling and non –probability judgemental sampling. Saunders *et al.* (2003) further discusses that with probability samples the chance, or the probability of each case being selected from the population is known and is usually equal for all cases. Conversely Saunders *et al.* (2003), explains that for non-probability samples, the probability of each case being selected from the total population is not known and it is impossible to answer the research question or to make statistical inference about the characteristics of the population. Saunders *et al.* (2003), state that probability sampling is most commonly associated with the survey-based research

Cooper & Emory, (1995), argues that one false belief exist that the sample size must be large or it is not representative. Cooper & Emory, (1995) states, that it is often claimed that the sample should be bear some proportional relationship to the size of the population from which it is drawn. Continuing from the above statement Cooper &

Emory, (1995), explains one hears such views, 'as the sample should be at least 10 percent or more of the population if it is to be credible'. This is not true. The absolute size of the sample is much more important than it sized compared with the population, (Cooper & Emory, 1995).

Saunders *et al.* (2003), notes that probability sampling is therefore a compromise between the accuracy of your findings and the amount of time and money you invest in collecting, checking and analysing you data, Saunders *et al.* (2003) also states your choice of sample size within this compromised is governed by competing influences. Saunders *et al.* (2003) goes on to explain that given these competing influences it is not surprising that the final sample size is almost always a matter of judgement as well as calculation.

Due to time constraints, the entire survey population, defined as all direct employees within Denel UAVS could not be surveyed, Sekaran *et al.* (2001), *cites* Krejcie & Morgan, (1970) who greatly simplified the sample size decision by providing a table that provides a good decision model. The sample size for a given population size, Table 11.4 of Sekaran *et al.* (2001:278) was used to determine the size of the sample. For a population (N) size of 56 cases, the table of Krejcie & Morgan (1970), *cited* by Sekaran *et al.* (2001), stipulates a sample size (S) of approximately 48 cases, to be representative of the population.

3.8 Data handling

To conduct the survey within Denel UAVS, special permission was required from Mr. Tsepo Monaheng: General Manager Denel UAVS. Mr. Tsepo Monaheng granted permission to conduct the study, the letter received by Mr Tsepo Monaheng, a copy of which is attached in Appendix A.

As can be deduced from the above in the e-mail communication to be sent out to the respondents, the strategy employed to distribute the questionnaire was, to use personalised e-mail communication, especially considering the relatively small sample size. Denel UAVS intranet (Microsoft Outlook) was used to forward the e-mail to and received back from the respondent. The choice of this strategy was justified due to every employee within Denel UAVS having access to e-mail; therefore for distributing

the questionnaire it was the most appropriate and suitable means of administering the survey. The respondents were also offered the use of the internal mail services of Denel UAVS to return their completed questionnaires to the researcher, to maintain their anonymity in their response.

3.9 Conclusion

This chapter of the research project documented the planning and the process utilised in the empirical study. The chapter gave an overview of the literature relevant to the research methodology and presented discussions on the types of data to be obtained from the research. Further discussions ensued on the use of the Likert Scale, the method selected for the collection of data (i.e. the questionnaire), type and choice of questions used in the questionnaire, the methodology used to develop the research questionnaire, the description of survey population and the determined sample size and finally the handling of data.

It can be concluded from this chapter that the survey instrument (questionnaire) followed a methodological process in its development; the value of adhering to this process will be visible when meeting the research objective.

The value that this chapter added to the field of research is that, one needs to methodologically plan and pre-emptively conceptualize the outcome of your research process. It is only once you have done this, there will be more coherencies in your endeavour.

In Chapter 4 a summary of the empirical findings based on the analysis of the data gathered from employees within Denel: UAVS, via the means of questionnaires will be provided. The data gathered will be presented in tabular format, expressed graphically and specific sections of the questionnaires will be statistically analyzed.

CHAPTER 4

DISCUSSION OF FINDINGS

4.1 Introduction

The previous chapter outlined the research methodology that guided the empirical component of this research project. This chapter will provide a summary of the empirical findings based on the analysis of the data gathered from employees within Denel UAVS, via the means of questionnaires. The data gathered will be presented in tabular format, expressed graphically and specific sections of the questionnaires will be statistically analyzed in this chapter.

The purpose of the data analysis is to determine the perception of the respondents pertaining to the study objectives discussed in Chapter 2. The data analyzed and presented in this chapter will enable the researcher to make conclusions regarding the reasons why projects executed within Denel UAVS do not meet the objectives as set out in beginning of the project.

The analysis of the data gathered from the questionnaires was analysed with the aid of a statistical software tool, SPSS. The data was compiled on a Microsoft Excel Spread Sheet (Appendix D-1), before being analysed by the SPSS statistical software tool

The results obtained from the statistical analysis and the interpretation of the results will be used to draw conclusions and provide a basis for recommendations that will be discussed in the next chapter of this research project (Chapter 5).

4.2 Description of sample

The sample size consisted of questionnaires forwarded to 48 direct employees within Denel UAVS. The participants of the survey were selected on a probability basis, based on the concept of random selection. Adding the names of the population in a box ensured that the participants were randomly chosen. The names of 48 employees were drawn and were selected to participate in the survey. The survey was concluded on the 27 November 2006. A total of 29 respondents participated by completing the

questionnaires in the survey. The response received (response rate) from employees of Denel UAVS was 60% of the sample size. Babbie (1998) states that a 50% response rate can be considered as “adequate”, a 60% response rate can be considered as “good” while a 70% response rate can be seen as “very good”, therefore the response rate for this survey is considered good.

Out of the total of 29 respondents, all the respondents completed all the questions. The researcher edited the raw data contained in the questionnaires and made entries to a compiled Microsoft Excel spread sheet (Appendix D1 – Data Matrix). It must be mentioned that Question 2 of the questionnaire posed a problem for respondents as many of the respondents had selected multiple groupings for areas of project involvement.

Cooper & Emory (1995:380) states that the editor’s responsibility is to decide which of the responses is consistent with the intent of the question or information in the survey and the most accurate for the individual respondent. The researcher being familiar with the organisation and the respondents acted as editor and decided on the appropriate response. This is visible when comparing the questionnaire with the recorded responses in Appendix D1.

4.3 Descriptive Statistics

4.3.1 Position held in Organisation

Figure 4.3.1 reflects the distribution of the respondents’ position within Denel UAVS. Top management was in the minority; constituting 3%, Senior Management constituted 14%. The Professionally Qualified/ Experience Specialist/ Middle Management job classification showed the highest respondents of 55% followed by Skilled Technical and Academically Qualified/ Junior Management, which constituted 28%. There were no respondents from the Semi Skilled and Other job classification categories. The results are as expected, due to the small proportion of Top Management and Senior Management employees within the organisation in relation to the Professionally Qualified/ Experience Specialist/ Middle Management and Skilled Technical and Academically Qualified/ Junior Management employees. The ‘No respondents’ from Semi-Skilled and Other categories can also be explained as most of the employees selected in the sample fell in the job classification of Professionally Qualified/

Experience Specialist/ Middle Management and Skilled Technical and Academically Qualified/ Junior Management.

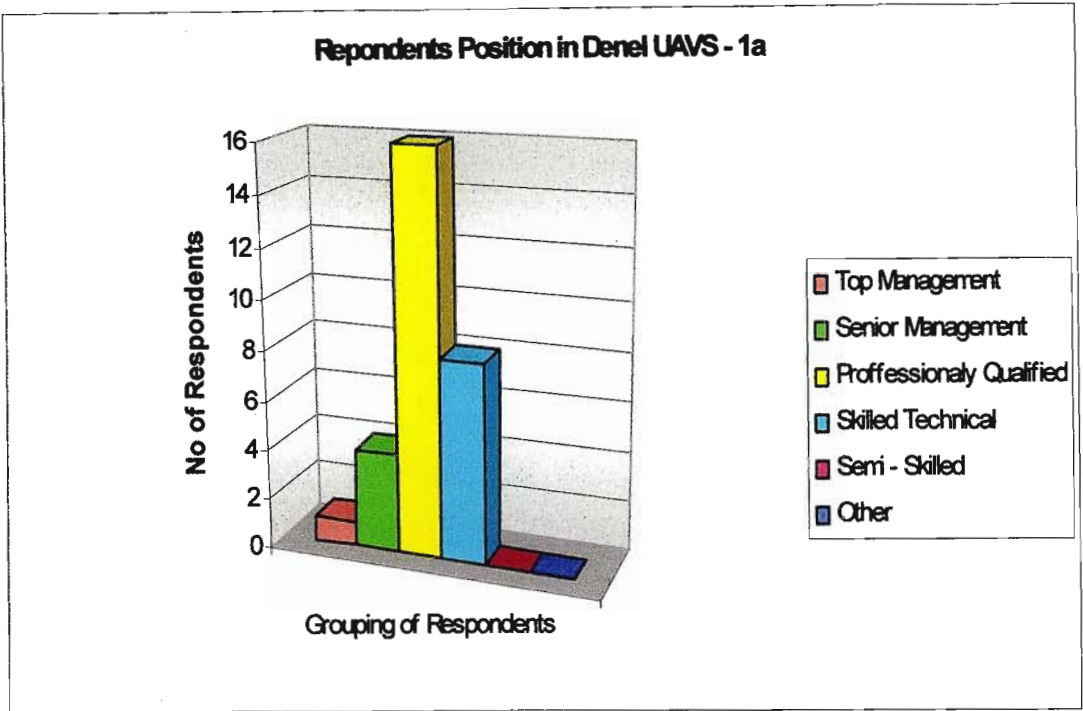


Figure 4.3.1 – Respondents position in Denel UAVS contribution to the study

4.3.2 Years Employed in Denel UAVS

The number of years the respondents have been employed by Denel UAVS is reflected in table 4.3.1. The highest response received was from respondents in the ‘More than 10 Years’ category (69%).

Number of Years employed in Denel UAVS	Frequency	Percent	Valid Percent	Cumulative Percent
0 - 1 Year	1	3.4	3.4	3.4
1 - 5 Years	4	13.8	13.8	17.2
5 - 10 Years	4	13.8	13.8	31.0
More than 10 Years	20	69.0	69.0	100.0
Total	29	100.0	100.0	

Table 4.3.1 - Number of years employed in Denel UAVS

4.3.3 Area of Project Involvement

The area of project involvement the respondents are involved in is reflected in figure 4.3.2 below. The figure below shows representation from all the categories except Product Installation and Commissioning. Zero response in this category can be attributed to the majority of the Product Installation and Commissioning employees being represented in the Product Testing category. The multi-tasking of employees within Denel UAVS is evident. This can be deduced from the response received in Question 2a of the Questionnaires, therefore employees within the Product Testing categories see their primary duties in Product Testing rather than their secondary tasks of Product Installation and Commissioning. The majority of the respondents participated from the Engineering (32%), Project Management (24%), Support Services (17%) and Product Testing (14%).

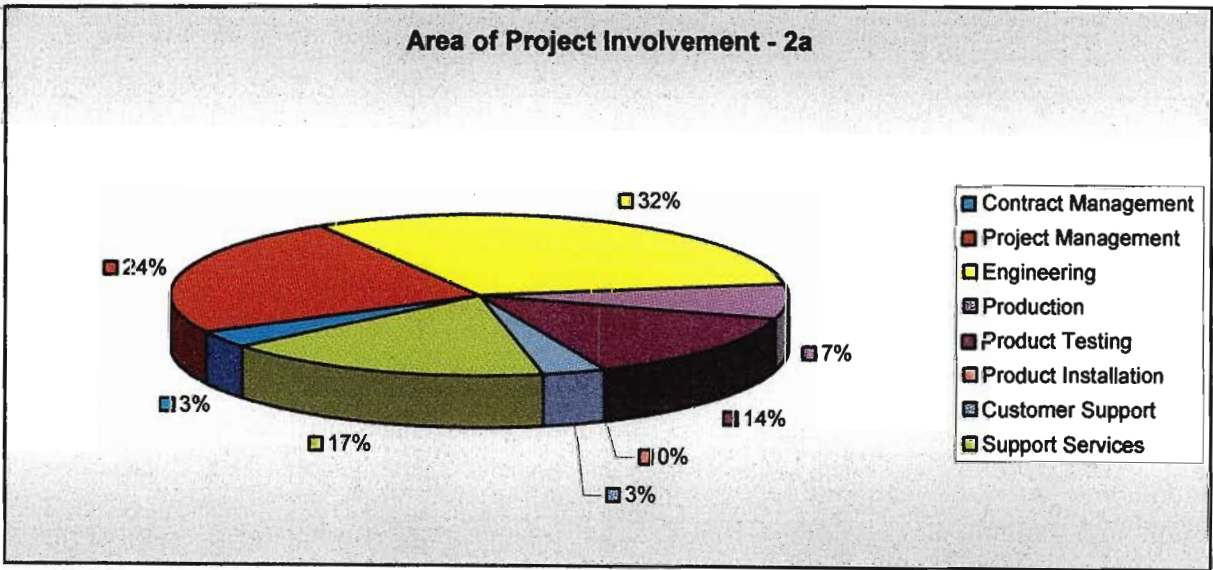


Figure 4.3.2 – Areas of Project Involvement contribution to the study

4.4 Central Tendency Stats for variables V1 to V28

The information from the collected data is summarized and described in terms of typical values, by defining variables and applying central tendency statistics as shown in Table 4.4.1:

Question Group	Study Variables	Description	Questions
Project Initiation	V1	Authorization for new Projects	3.1a
	V2	Programme management plans	3.1b
	V3	Lessons Learnt from previous Projects	3.1c
	V4	Human resource requirements for Projects	3.1d
Project Planning	V5	Activities defined in Project Plan	3.2a
	V6	Project scope of work	3.2b
	V7	Definition of human resource requirements	3.2c
	V8	Cost estimation reflects resource requirements	3.2d
	V9	Cost budget for Project	3.2e
	V10	Quality Plans - quality standards	3.2f
	V11	Communication Plans - communication needs	3.2g
	V12	Risk Management Plans - management of Risk	3.2h
	V13	Procurement Schedule – what and when to purchase	3.2i
Project Execution	V14	Project managers work in accordance to Project plan	3.3a
	V15	Quality Assurance activities in accordance to Quality Plans	3.3b
	V16	Contracting of human resources	3.3c
	V17	Enhancement of competencies through continuous training	3.3d
	V18	Availability of Project information	3.3e
	V19	Contracting of suppliers, subcontractors and strategic resources	3.3f
Project Monitoring and Control	V20	Measurement of Project performance	3.4a
	V21	Assessment of project performance to determine corrective and preventive action	3.4b
	V22	Tracking and monitoring of project risks	3.4c
	V23	Monitoring of product quality against Product Quality Plan	3.4d
	V24	Monitoring and controlling of project cost against Project targets	3.4e
	V25	Monitoring of Project Schedule	3.4f
	V26	Monitoring of Project team members performance	3.4g
Project Closure	V27	Closure of Project once deliverables are made and administratively close on SAP	3.5a
	V28	Formal closure meeting with checklist	3.5b

Table 4.4.1: Description of the study variables –Project Management Process

4.4.1 Central tendency statistics for variables V1, V2, V3, V4

The variables V1, V2, V3, V4 relate to Project Initiation Process within Denel UAVS.

The measurement scales for these variables are outlined below:

The measurement scale for Variable V1, V2, V3, V4 are,

1 = Strongly Agree

- 2 = Agree
- 3 = Disagree
- 4 = Strongly Disagree

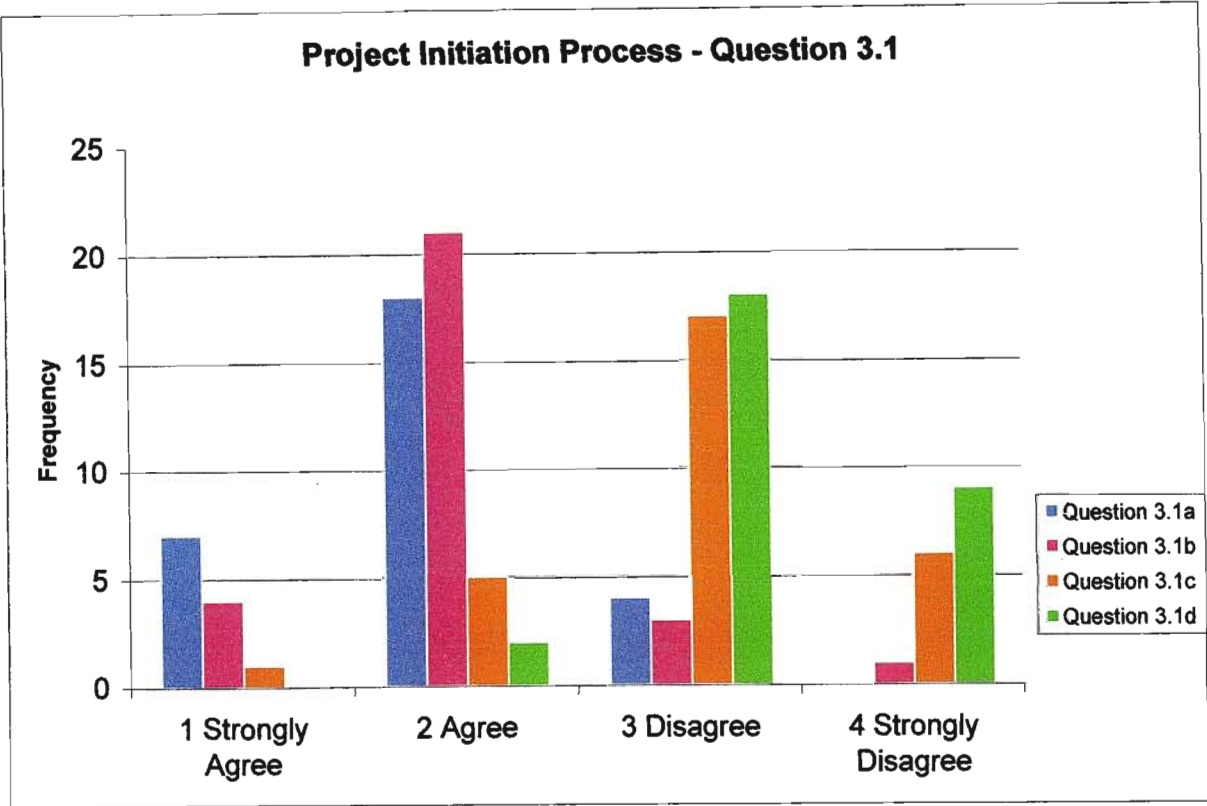


Figure 4.4.1: Project Initiation Process – Number of cases per variables

		V1	V2	V3	V4
N	Valid	29	29	29	29
	Missing	0	0	0	0
Mean		3.00	3.00	2.00	2.00
Median		3.00	3.00	2.00	2.00
Mode		3	3	2	2
Std. Deviation		.618	.626	.731	.591
Variance		.382	.392	.534	.350
Range		2	3	3	2
Minimum		2	1	1	1
Maximum		4	4	4	3

Table 4.4.2 - Central tendencies for variables Project Initiation Process

4.4.1.1 Mean

Sekeran *et al* (2001) state that the mean or the average is a measure of central tendency that offers a general picture of the data without unnecessarily inundating one with each of the observations in a data set.

It must be mentioned that all the variables were measured on four-point scale. Table 4.4.2, contains the arithmetic average of the responses and the results for variables V1, V2, V3, V4, the results are interpreted as follow:

The study variables V1 and V2 mean value is 3.00, this reveals that the respondents participated in this project have articulated average perception to **agree** towards the above-mentioned study variables.

The study variables V3 and V4 mean value is 2.00, this reveals that the respondents participated in this project have articulated average perception to **disagree** towards the above-mentioned study variables

4.4.1.2 Median

Sekeran *et al* (2001) explains that the median is the central item in a group of observations when they are arranged in either ascending or descending order. The midpoint of the responses and the results are the same as those indicated for the means when rounded off (due to a four point scale): The study variables V1 and V2 median value is 3.00, this indicates that **agree** is the median perception of respondents.

The study variables V3 and V4 median value is 2.00, this indicates that **disagree** is the median perception of respondents

4.4.1.3 Mode

Sekeran *et al* (2001) notes that in some cases, a set of observations would not lend itself to a meaningful representation through either the mean or the median, but could be described by the most frequently occurring phenomenon. The study variables V1 and V2 mode value is 3.00, this indicates **agree** is mode perception of respondents.

The study variables V3 and V4 mode value is 2.00, this indicates that **disagree** is the mode perception of respondents.

4.4.1.4 The standard deviation

Sekeran *et al* (2001) explains that the standard deviation is another measure of dispersion for interval and ratio scaled data. The standard deviation summarizes how far away from the average the data values typically are. The study variables V1, V2, V3

and V4 have standard deviation from 0.591 to 0.731; this reveals that there is a difference in respondent's perception towards these variables

4.4.1.5 Variance

The study variables V1, V2, V3 and V4 have variance from 0.350 to 0.534; this reveals that there is a variance in respondent's perception towards these variables.

4.4.1.6 Range

The study variables V1, V2, V3 and V4 have range values between 2.00 and 3.00-this indicates that there is a difference in respondent's perception towards these variables and the respondents have expressed all types of opinions towards the study questions.

4.4.1.7 Minimum

The study variable V1 has a minimum value 2.00 this indicates that respondents have articulated minimum perception to **disagree**.

The study variables V2, V3, and V4 have a minimum value 1.00 this indicates that respondents have articulated minimum perception to **strongly disagree**.

4.4.1.7 Maximum

The study variables V1 V2 and V3 have maximum value 4.00 this indicates that respondents have articulated maximum perception to **strongly agree**.

The study variable V4 has maximum value 3.00 this indicates that respondents have articulated minimum perception to **agree**.

4.4.2 Central tendency statistics for variables V5 to V13

The variables V5 to V13 relate to Project Planning Process within Denel UAVS. The measurement scales for these variables are outlined below:

The measurement scale for Variable V5 to V13 are,

1 = Strongly Agree

2 = Agree

3 = Disagree

4 = Strongly Disagree

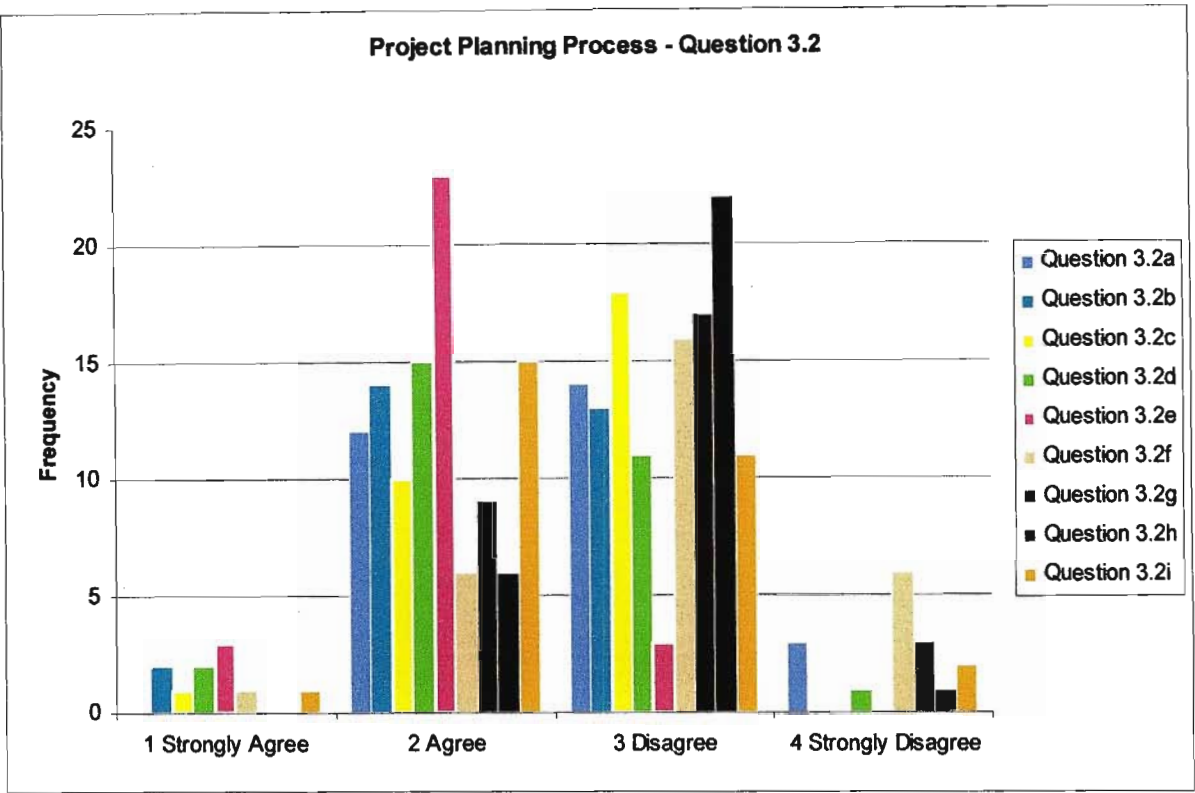


Figure 4.4.2: Project Planning Process – Number of cases per variables

Figure 4.4.2, gives a graphical representation of the overall responses received for variables V5 to V13 related to the Project Planning Process within Denel UAVS.

		V5	V6	V7	V8	V9	V10	V11	V12	V13
N	Valid	29	29	29	29	29	29	29	29	29
	Missing	0	0	0	0	0	0	0	0	0
Mean		2.00	3.00	2.00	3.00	3.00	2.00	2.00	2.00	3.00
Median		2.00	3.00	2.00	3.00	3.00	2.00	2.00	2.00	3.00
Mode		2	3	2	3	3	2	2	2	3
Std. Deviation		.660	.736	.568	.677	.463	.753	.620	.468	.688
Variance		.436	.542	.323	.458	.214	.567	.384	.219	.473
Range		2	3	2	3	2	3	2	2	3
Minimum		1	1	2	1	2	1	1	1	1
Maximum		3	4	4	4	4	4	3	3	4

Table 4.4.3: Central tendencies for variables related Project Planning Process

4.4.2.1 Mean

The arithmetic average of the responses and the results for variables V5 to V13, as shown in Table 4.4.3, are as follows:

The study variables V6, V8, V9, and V13 have mean value 3.00, this reveals that the respondents participated in this project have articulated average perception to **agree** towards the above-mentioned study variables.

The study variables V5, V7, V10 V11 and V12 have mean value 2.00, this reveals that the respondents participated in this project have articulated average perception to **disagree** towards the above-mentioned study variables.

4.4.2.2 Median

The study variable V6, V8, V9 and V13 median value is 3.00, this indicates that **agree** is the median perception of respondents.

The study variable V5, V7, V10 V11 and V12 median value is 2.00, this indicates that **disagree** is the median perception of respondents.

4.4.2.3 Mode

The study variables V6, V8, V9 and V13 mode value is 3.00, this indicates that **agree** is the mode perception of respondents.

The study variables V5, V7, V10 V11 and V12 mode value is 2.00, this indicates that **disagree** is the mode perception of respondents.

4.4.2.4 The standard deviation

The study variables V5 to V13 have standard deviation from 0.463 to 0.753; this reveals that there is a difference in respondent's perception towards these variables.

4.4.2.5 Variance

The study variables V5 to V13 have variance from 0.214 to 0.567; this reveals that that there is a variance in respondent's perception towards these variables.

4.4.2.6 Range

The study variables V5 to V13 have range values between 2 and 3 this indicates that there is a difference in respondent's perception towards these variables and the respondents have expressed all types of opinions towards the study questions.

4.4.2.7 Minimum

The study variable V7 and V9 has minimum value 2.00, this indicates that respondents have articulated minimum perception to **disagree**.

The study variables V5, V6, V8, V10, V11, V12 and V13 have minimum value 1.00, this indicates that respondents have articulated minimum perception to **strongly disagree**.

4.4.2.7 Maximum

The study variable V6, V7, V8, V9, V10 and V13 have maximum value 4.00, this indicates that respondents have articulated maximum perception to **strongly agree**.

The study variable V5, V11 and V12 have maximum value 3 this indicates that respondents have articulated minimum perception to agree.

4.4.3 Central tendency statistics for variables V14 to V19

The variables V14 to V19 relate to Project Execution Process within Denel UAVS. The measurement scales for these variables are outlined below:

The measurement scale for Variable V14 to V19 is,

1 = Strongly Agree

2 = Agree

3 = Disagree

4 = Strongly Disagree

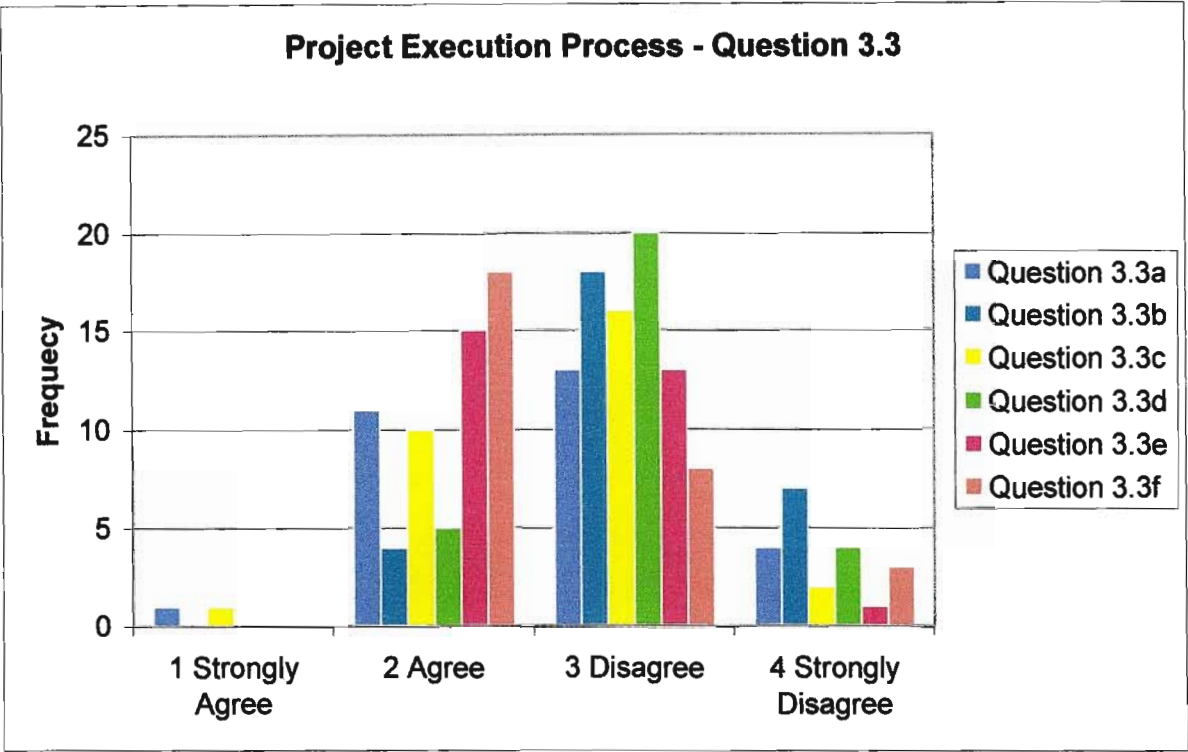


Figure 4.4.3: Project Execution Process – Number of cases per variables

Figure 4.4.3, gives a graphical representation of the overall responses received for variables V14 to V19 related to the Project Execution Process within Denel UAVS.

		V14	V15	V16	V17	V18	V19
N	Valid	29	29	29	29	29	29
	Missing	0	0	0	0	0	0
Mean		2.00	2.00	2.00	2.00	2.00	3.00
Median		2.00	2.00	2.00	2.00	3.00	3.00
Mode		2	2	2	2	3	3
Std. Deviation		.761	.618	.670	.566	.574	.688
Variance		.579	.382	.448	.320	.330	.473
Range		3	2	3	2	2	2
Minimum		1	1	1	1	1	1
Maximum		4	3	4	3	3	3

Table 4.4.4: Central tendencies for variables related Project Execution Process

4.4.3.1 Mean

The arithmetic average of the responses and the results for the variables V14 to V19 as shown in Table 4.4.4, are as follows:

The study variable V19 has mean value 3.00, this reveals that the respondents participated in this project have articulated average perception to **agree** towards the above-mentioned study variable.

The study variables V14, V15, V16 V17 and V18 have mean value 2.00, this reveals that the respondents participated in this project have articulated average perception to **disagree** towards the above-mentioned study variables.

4.4.3.2 Median

The study variable V18 and V19 median value is 3.00, this indicates that **agree** is the median perception of respondents.

The study variable V14, V15, V16 and V17 median value is 2.00, this indicates that **disagree** is the median perception of respondents.

4.4.3.3 Mode

The study variable V18 and V19 mode value is 3.00, this indicates that **agree** is the mode perception of respondents.

The study variables V14, V15, V16 and V17 mode value is 2.00, this indicates that **disagree** is the mode perception of respondents.

4.4.3.4 The standard deviation

The study variables V14 to V19 have standard deviation from 0.574 to 0.761; this reveals that there is a difference in respondent's perception towards these variables.

4.4.3.5 Variance

The study variables V14 to V19 have variance from 0.320 to 0.579; this reveals that there is a variance in respondent's perception towards these variables.

4.4.3.6 Range

The study variables V14 to V19 have range values between 2.00 and 3.00 this indicates that there is a difference in respondent's perception towards these variables and the respondents have expressed all types of opinions towards the study questions.

4.4.3.7 Minimum

The study variables V14, V15, V16, V17, V18, and V19 have minimum value 1.00; this indicates that respondents have articulated minimum perception to **strongly disagree**.

4.4.3.8 Maximum

The study variable V14 and V16 have maximum value 4.00, this indicates that respondents have articulated maximum perception to **strongly agree**.

The study variable V15, V17, V18 and V19 have maximum value 3.00, this indicates that respondents have articulated minimum perception to **agree**.

4.4.4 Central tendency statistics for variables V20 to 26

The variables V20 to V26 relate to Project Monitoring and Control Process within Denel UAVS. The measurement scales for these variables are outlined below:

The measurement scale for Variable V20 to 26 are,

- 1 = Strongly Agree
- 2 = Agree
- 3 = Disagree
- 4 = Strongly Disagree

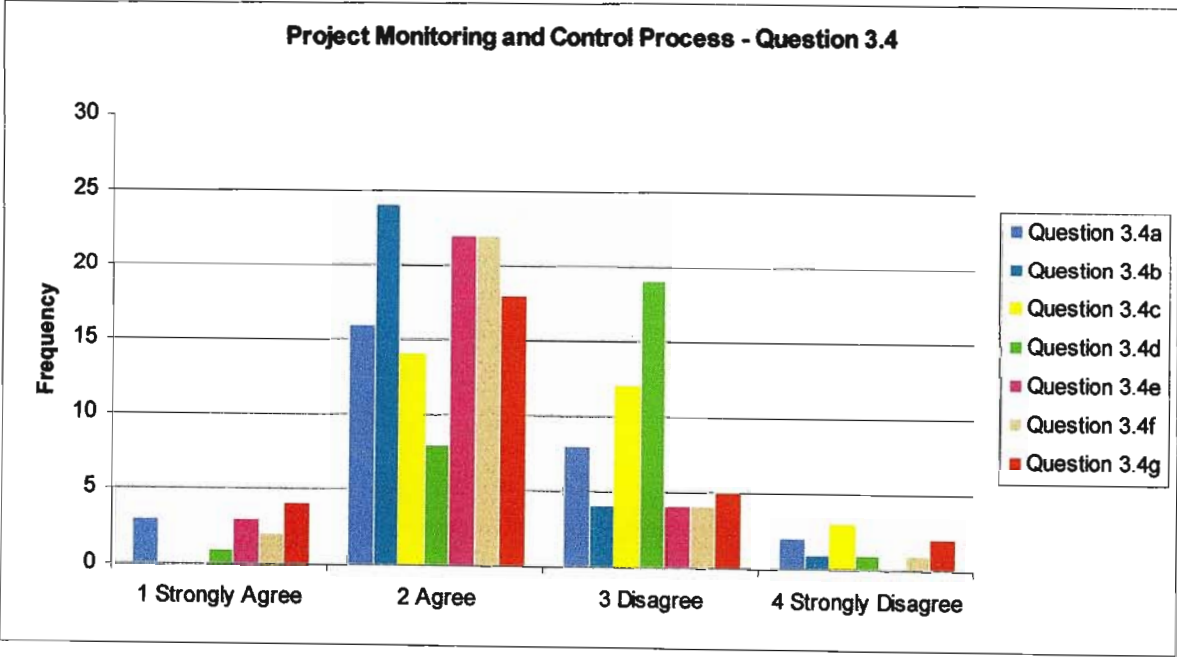


Figure 4.4.4: Project Monitoring and Control Process – Number of cases per variables

Figure 4.4.4, gives a graphical representation of the overall responses received for variables V20 to V26 related to the Project Monitoring and Control Process within Denel UAVS.

		V20	V21	V22	V23	V24	V25	V26
N	Valid	29	29	29	29	29	29	29
	Missing	0	0	0	0	0	0	0
Mean		3.00	3.00	2.00	2.00	3.00	3.00	3.00
Median		3.00	3.00	2.00	2.00	3.00	3.00	3.00
Mode		3	3	3	2	3	3	3
Std. Deviation		.761	.491	.677	.604	.499	.581	.759
Variance		.579	.241	.458	.365	.249	.337	.576
Range		3	2	2	3	2	3	3
Minimum		1	1	1	1	2	1	1
Maximum		4	3	3	4	4	4	4

Table 4.4.5: Central tendencies for variables related to Project Monitoring and Control Process

4.4.4.1 Mean

The arithmetic average of the responses and the results for variables V20 to V26, as shown in Table 4.4.5, are as follows:

The study variable V20, V21, V24, V25 and V26 have mean value 3.00, this reveals that the respondents participated in this project have articulated average perception to **agree** towards the above-mentioned study variables.

The study variables V22 and V23 have mean value 2.00, this reveals that the respondents participated in this project have articulated average perception to **disagree** towards the above-mentioned study variables.

4.4.4.2 Median

The study variable V20, V21, V24, V25 and V26 median value is 3.00, this indicates **agree** is the median perception of respondents.

The study variable V22 and V23 median value is 2.00, this indicates that **disagree** is the median perception of respondents.

4.4.4.3 Mode

The study variable V20, V21, V23, V24, V25 and V26 mode value is 3.00, this indicates that **agree** is the mode perception of respondents.

The study variables V22 mode value is 2.00, this indicates that **disagree** is the mode perception of respondents.

4.4.4.4 The standard deviation

The study variables V20 to V26 have standard deviation from 0.491 to 0.761; this reveals that there is a difference in respondent's perception towards these variables.

4.4.4.5 Variance

The study variables V20 to V26 have variance from 0.241 to 0.579; this reveals that there is a variance in respondent's perception towards these variables.

4.4.4.6 Range

The study variables V20 to V26 have range values between 2 and 3 this indicates that there is a difference in respondent's perception towards these variables and the respondents have expressed all types of opinions towards the study questions.

4.4.4.7 Minimum

The study variable V24 has minimum value 2.00; this indicates that respondents have articulated minimum perception to **disagree**.

The study variables V20, V21, V22, V23, V25, and V26 have minimum value 1.00; this indicates that respondents have articulated minimum perception to **strongly disagree**.

4.4.4.8 Maximum

The study variable V20, V23, V24, V25 and V26 have maximum value 4.00, this indicates that respondents have articulated maximum perception to **strongly agree**.

The study variable V21 and V22 have maximum value 3.00 this indicates that respondents have articulated minimum perception to **agree**.

4.4.5 Central tendency statistics for variables V27 and V28

The variables V27 and V28 relate to Project Monitoring and Control Process within Denel UAVS. The measurement scales for these variables are outlined below:

The measurement scale for Variable V27, V28 are,

1 = Strongly Agree

2 = Agree

- 3 = Disagree
- 4 = Strongly Disagree

Figure 4.4.5, gives a graphical representation of the overall responses received for variables V27 and V28 related to the Project Monitoring and Control Process within Denel UAVS.

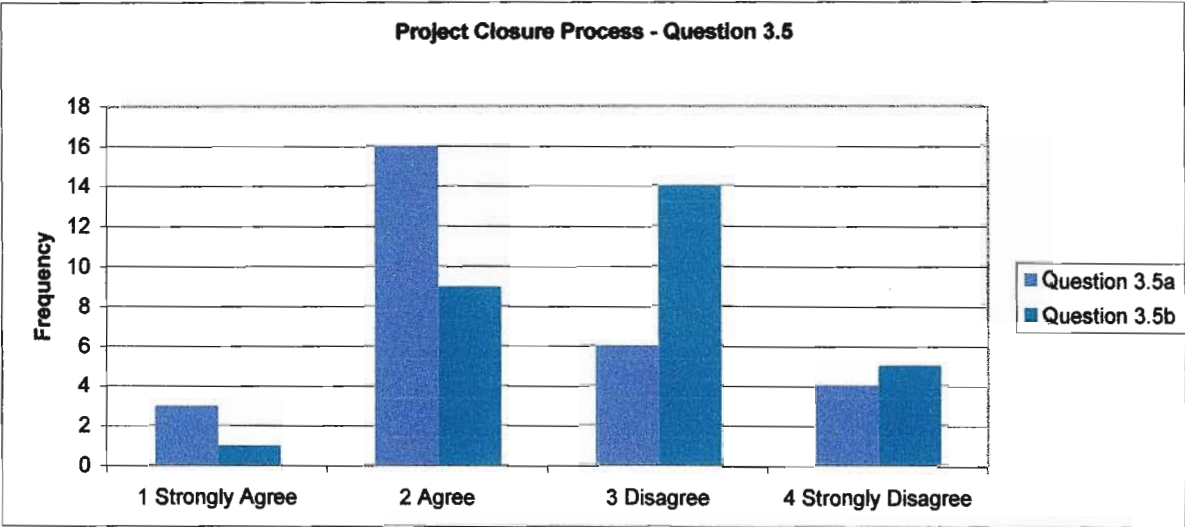


Figure 4.4.5: Project Closure Process – Number of cases per variables

		V27	V28
N	Valid	29	29
	Missing	0	0
Mean		3.00	2.00
Median		3.00	2.00
Mode		3	2
Std. Deviation		.862	.774
Variance		.744	.599
Range		3	3
Minimum		1	1
Maximum		4	4

Table 4.4.6: Central tendencies for variables related to Project Closure Process

4.4.5.1 Mean

The arithmetic average of the responses and the results for the variable V27 and V28, as contained in Table 4.4.6, are as follows.

The study variable V27 has mean value 3.00, this reveals that the respondents participated in this project have articulated average perception to **agree** towards the above-mentioned study variable.

The study variable V28 has mean value 2.00, this reveals that the respondents participated in this project have articulated average perception to **disagree** towards the above-mentioned study variable.

4.4.5.2 Median

The study variable V27 median value is 3.00, this indicates that **agree** is the median perception of respondents.

The study variable V28 median value is 2.00, this indicates that **disagree** is the median perception of respondents.

4.4.5.3 Mode

The study variable V27 mode value is 3.00, this indicates that **agree** is mode perception of respondents.

The study variables V28 mode value is 2.00, this indicates that **disagree** is mode perception of respondents.

4.4.5.4 The standard deviation

The study variables V27 and V28 have standard deviation from 0.774 to 0.862; this reveals that there is a difference in respondent's perception towards these variables.

4.4.5.5 Variance

The study variables V27 and V28 have variance from 0.599 to 0.762; this reveals that there is a variance in respondent's perception towards these variables.

4.4.5.6 Range

The study variables V27 and V28 have range value 3.00, this indicates that the respondent's perception is the same towards these variables and the respondents have expressed the same opinions towards the study questions.

4.4.5.7 Minimum

The study variables V27 and V28 have minimum value 1.00 this indicates that respondents have articulated minimum perception to **strongly disagree**.

4.4.5.8 Maximum

The study variables V27 and V28 have maximum value 4.00, this indicates that respondents have articulated maximum perception to **strongly agree**.

4.5 Closed ended and Scaling Questions

4.5.1 Size of Project normally undertaken by Denel UAVS

Respondents were asked to indicate, in terms of financial value, the size of projects normally executed within Denel UAVS. Table 4.5.1 provides details of the size of projects normally undertaken by Denel UAVS.

Size of Projects normally undertaken by Denel UAVS	Frequency	Percent	Valid Percent	Cumulative Percent
Below R 10 million	0	0	0	0
Between R 10 million and R 50 million	7	24	24	24
Between R 50 million and R 100 million	11	38	38	62
Between R 100 million and R 150 million	11	38	38	100
Above R 200 million	0	0	0	
Total	29	100	100	

Table 4.5.1 – Size of projects normally undertaken by Denel UAVS

38% of the respondents indicated that the size of the projects normally undertaken by Denel UAVS are between the R 50 million and R 100 million, 38% of the respondents also indicated that projects between R 100 million and R150 million are normally undertaken by Denel UAVS. 24% of the respondents felt projects between R 10 million and R50 million are normally undertaken Denel UAVS.

It can be deduced the projects normally undertaken by Denel UAVS is between the R 50 million and R 150 million. There is however some level of uncertainty by the respondents pertaining to the size of project normally undertaken by Denel UAVS, this can be attributed to respondents only being involved on sub elements of the main project probably answered according to the size of the sub element.

4.5.2 Project Rating

Respondents were asked to rate projects normally executed within Denel UAVS, in terms of complexity, uncertainty, resource criticality, differentiation and technology

Complexity. Table 4.5.2 provides details of the characteristics of projects normally undertaken by Denel UAVS.

Project characteristics	Low	Medium	High	Total
Level of complexity	3%	17%	80%	100%
Level of uncertainty	7%	65%	28%	100%
Level of resource criticality	0%	17%	83%	100%
Level of differentiation	7%	76%	17%	100%
Level of technology complexity	0%	35%	65%	100%

Table 4.5.2 – Characteristics of projects normally undertaken by Denel UAVS

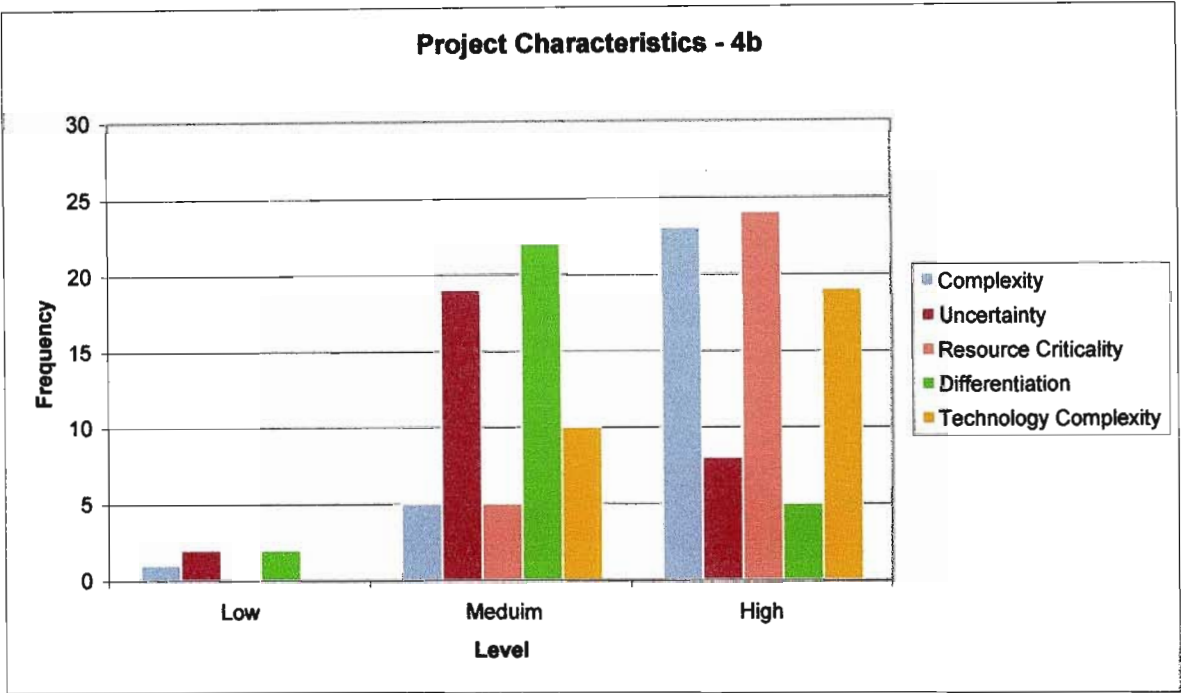


Figure 4.5.1: Project Characteristics

80% of the respondents rated the level of complexity of projects normally executed in Denel UAVS as **high**, 65% rated the level of uncertainty as **medium**, 83 % rated the level of resource criticality as **high**, 76% rated the level of differentiation as medium and 66% of the respondents rate the level of technology complexity as **high**.

As can be deduced from the above figures, projects normal undertaken by Denel UAVS are higher than R 100 million with a high level of complexity, medium level of uncertainty, high level of resource criticality, medium level of differentiation and a high level of technology complexity.

4.5.3 Type of Organisational Structure

4.5.3.1 Respondents were asked to indicate the type of organisational structures currently being adopted by Denel UAVS. Table 4.5.3 below provides details of the organisational structured mostly used in Denel UAVS.

Type of Organisation Structure	Percentage
Matrix type organisation structure	17%
Functional type organisation structure	31%
Project - based organisational structure	52%
Other	0%
Total	100%

Table 4.5.3– Type of organisational Structure currently being adopted by Denel UAVS

52% of the respondents indicated that the type of organisational structure being adopted by Denel UAVS is Project based, 31% indicated Functional type and 17% indicated Matrix Type.

Respondents were asked to give their opinion on the type of organisational structure that is most appropriate and conducive to project success within Denel UAVS. Table 4.5.4 below provides details on the respondents' opinion of the most conducive organisational structure for project success within Denel UAVS.

Type of Organisation Structure most conducive to Project Success	Percentage
Matrix type organisation structure	7%
Functional type organisation structure	11%
Project - based organisational structure	41%
Depends on the type of project being executed.	41%
Total	100%

Table 4.5.4 – Type of organisational Structure needed for Project Success

41% of the respondents indicated both the 'Project based and dependent on the type of project being executed' were the most conducive to project success, 11% indicated Functional type and 7% indicated matrix type.

It can be deduced from the results above that Denel UAVS seems to be adopting multiple organisational structures within the organisation. Respondents have mixed opinions concerning the organisational structure most conducive to project success.

4.5.4 Organisational Role or Capability

Respondents were asked to choose from the list, **one** of the most important Organisational Role or Capability required for a successful project within Denel UAVS.

Most important Organisational Role or Capability required for success	Percentage
Senior Management Support	3%
Support Function performance against contracted milestones, i.e. Procurement, Quality, Human Resources, etc.	35%
Infrastructure and Equipment	0%
Fostering a Project Management culture	3%
Equipping project team members with the correct skills and competencies required by the project.	3%
Teamwork	18%
Organisational values	0%
Ensuring project management processes and procedure are in place and established as a Company Organisational Standard and Documentation (COSAD)	0%
Efficiencies and effectiveness of processes within UAVS	7%
Empowering the Project Manager with sufficient authority, clear responsibility and defined accountability.	28%
Technical Leadership	0%
Clearly communicated organisational goals and objectives associated with the project.	3%
Total	100%

Table 4.5.5 – Most important Organisational role and capability required for Project Success

The three most important roles and capabilities chosen by the respondents for project success are, 1) Support Function performance against contracted milestones, i.e. Procurement, Quality, Human Resources. (35%), 2) Empowering the Project Manager with sufficient authority, clear responsibility and defined accountability (28%) and 3) Teamwork (18%)

4.5.5 Project Managers Interpersonal Skills and Traits

4.5.5.1 Respondents were asked to choose from the list **one** of the most important interpersonal skills required by the project manager to ensure a successful project within Denel UAVS. Their response to the question is shown in Table 4.5.6 below.

Most important Interpersonal Skill required for Project Success	Percentage
Leadership	59%
Problem solving skills	3%
Effective communication skills	17%
Ability to motivate	14%
Problem solving skills	7%
Negotiating skills	0.0%
Total	100%

Table 4.5.6 – Most important interpersonal skill required for Project Success

Respondents indicated Leadership (59%) as the most important Interpersonal Skill needed by Project Managers for project success within Denel UAVS.

4.5.5.2 Respondents were asked to choose from the list **one** of the most important personal traits required by the project manager to ensure a successful project within Denel UAVS. Their response to the question is shown in Table 4.5.7.

Most important Personal Trait required for Project Success	Percentage
Personal Integrity	21%
Professional Integrity	38%
Eagerness	3%
Decisiveness	7%
Truthfulness	0%
Confident	0%
Well Organized	31%
Even Tempered	0%
Total	100%

Table 4.5.7 – Most important Personal Trait required for Project Success

The three most important personal traits that need to be displayed by Project Managers

within Denel UAVS are, 1] Professional Integrity (38%), 2] Well Organized (31%), 3] Personal Integrity (21%).

Therefore, Project Managers with Denel UAVS need to exhibit strong leadership and display professional integrity, be well organized and also portray personal integrity to ensure that projects are successful.

4.5.6 Definition of Project Success

Respondents were asked to select from a list, the best definition of a successful project in Denel UAVS. Table 4.5.8 below shows their response to the question.

Best definition of Project Success	Percentage
The project objectives meets customer requirements	3%
The project meets the target cost, schedule, quality and product functionality	52%
The product meets customer satisfaction	35%
The deliverables were produced on time and within the budget	0.0%
The project satisfied the business requirements and meet the objectives of the stakeholders	10%
Other	0%
Total	100%

Table 4.5.8 – Best definition of Project Success

The two best definitions of project success indicated by the respondents are, 1) the project meets the target cost, schedule, quality and product functionality (52%) and 2) the product meets customer satisfaction (35%).

Therefore, a project is seen as successful within Denel UAVS when the project meets the target cost, schedule, quality and product functionality and the product meets the customers’ satisfaction.

4.5.7 Reason for Project Failure

Respondents were asked to select from a list the most important reason for projects not meeting the desired outcomes in Denel UAVS. Table 4.5.9 below shows their response to the question.

Reasons for Projects not meeting the desired outcomes	Percentage
Incorrect project estimation in the proposal phase of the contract	22%
Incomplete project scope	3%
Poor Project Planning	7%
Inadequate Staffing of project resource requirements	31%
Incomplete Customer Requirements	3%
Incomplete Risk Management	7%
No Project Management Culture	0%
Poor Project Manager Interpersonal Skills	0%
Lessons learnt from previous projects not incorporated in new projects	7%
Lack of Technical Skills and Technical Leadership	10%
Lack of Senior Management Support	0%
Other	10%
Total	100%

Table 4.5.9 – Reasons for Projects not meeting the desired outcomes

The two main reasons for projects not meeting the desired outcomes as indicated by the respondents are, 1) Inadequate Staffing of project resource requirements (31%) and 2) Incorrect project estimation in the proposal phase of the contract (22%).

Therefore, to increase the chances of projects within Denel UAVS meeting the desired outcomes, the project must be estimated correctly in the proposal phase and the project must be staffed with the necessary human resources.

4.6 Inferential Statistics

4.6.1 Cronbach Alpha test (Reliability Analysis)

Interpretation Rules:

- a) If Cronbach Alpha value is between 0.4 and 0.7, it is an indication of **medium** internal consistency and reliability.
- b) If Cronbach Alpha value is between 0.7 and 1.0, it is an indication of high or good internal consistency and reliability

Case Processing Summary

		N	%
Cases	Valid	29	100.0
	Excluded	0	.0
	Total	29	100.0

Table 4.6.1 – Case Processing Summary

Reliability Statistics

Cronbach's Alpha	N of Items
.899	28

Table 4.6.2 – Reliability Statistics

The reliability analysis of the questionnaire's continuous study variables in table 4.6.2 reveals a Cronbach's alpha value 0.899, this indicates that the research instrument's (questionnaire) continuous study variables have adequate internal consistency and is reliable.

4.6.2 Anova Test – Perception of respondents per group (Job Classification)

Interpretation Rules:

- If **p** value is less than or equal **$p \leq 0.05$** , statistically there is significant difference between groups' opinions
- If **p** value is greater than **$p > 0.05$** , statistically there is **NO** significant difference between groups' opinions

*Note: **p** indicates probability.

In this test different grouping of the respondents were evaluated -the most significant group; that of Job Classification showed different perceptions towards the study variables V1 to V28. The Anova test results for variables V1 to V28 per job classification are presented in Table 4.6.3.

ANOVA

		Sum of Squares	df	Mean Square	Sig.
3.1a	Between Groups	1.065	3	.355	.445
	Within Groups	9.625	25	.385	
	Total	10.690	28		
3.1b	Between Groups	2.341	3	.780	.106
	Within Groups	8.625	25	.345	
	Total	10.966	28		
3.1c	Between Groups	4.403	3	1.468	.031
	Within Groups	10.563	25	.423	
	Total	14.966	28		
3.1d	Between Groups	2.918	3	.973	.029
	Within Groups	6.875	25	.275	
	Total	9.793	28		

Table 4.6.3 – Group perception towards variables V1 to V4

The Anova test result reveals that there is **statistically significant difference** in perceptions of the respondents from the different job classification groups towards the study variable V3 and V4. The statements **p** significance values are 0.031 and 0.029 respectively, which is less than **0.05** (this means respondents from the job classification group have significant difference in their perceptions towards these study statements and there is substantial difference in their opinions towards these study statements).

The Anova test result reveals that there is **no statistically significant difference** in perceptions of the respondents from the different job classification groups towards the study variable V1 and V2. The statements **p** significance values are 0.445 and 0.106 respectively, which is above **0.05** (this means respondents from the job classification group have no significant difference in their perceptions towards these study statements and there is no substantial difference in their opinions towards these study statements).

ANOVA

		Sum of Squares	df	Mean Square	Sig.
3.2a	Between Groups	1.832	3	.611	.246
	Within Groups	10.375	25	.415	
	Total	12.207	28		
3.2b	Between Groups	2.922	3	.974	.142
	Within Groups	12.250	25	.490	
	Total	15.172	28		
3.2c	Between Groups	.597	3	.199	.628
	Within Groups	8.438	25	.338	
	Total	9.034	28		
3.2d	Between Groups	4.515	3	1.505	.011
	Within Groups	8.313	25	.333	
	Total	12.828	28		
3.2e	Between Groups	1.563	3	.521	.053
	Within Groups	4.438	25	.178	
	Total	6.000	28		

Table 4.6.4 – Group perception towards variables V5 to V9

ANOVA

		Sum of Squares	df	Mean Square	Sig.
3.2f	Between Groups	2.425	3	.808	.238
	Within Groups	13.438	25	.538	
	Total	15.862	28		
3.2g	Between Groups	1.571	3	.524	.259
	Within Groups	9.188	25	.368	
	Total	10.759	28		
3.2h	Between Groups	.575	3	.192	.474
	Within Groups	5.563	25	.223	
	Total	6.138	28		
3.2i	Between Groups	1.054	3	.351	.549
	Within Groups	12.188	25	.488	
	Total	13.241	28		

Table 4.6.5 – Group perception towards variables V9 to V13

The Anova test result reveals that there is **statistically significant difference** in perceptions of the respondents from the different job classification groups towards the study variable V8. The statement **p** significance value is 0.011, which is less than **0.05** (this means respondents from the job classification group have significant difference in their perceptions towards the study statement and there is substantial difference in their opinions towards these study statement).

The Anova test result reveals that there is **no statistically significant difference** in perceptions of the respondents from the different job classification groups towards the

study variables V5, V6, V7, V9, V10, V11, V12 and V13. The statements **p** significance values are above **0.05** (this means respondents from the job classification group have significant difference in their perceptions towards these study statements and there is substantial difference in their opinions towards these study statements).

ANOVA

		Sum of Squares	df	Mean Square	Sig.
3.3a	Between Groups	1.832	3	.611	.383
	Within Groups	14.375	25	.575	
	Total	16.207	28		
3.3b	Between Groups	3.065	3	1.022	.035
	Within Groups	7.625	25	.305	
	Total	10.690	28		
3.3c	Between Groups	2.052	3	.684	.208
	Within Groups	10.500	25	.420	
	Total	12.552	28		
3.3d	Between Groups	2.153	3	.718	.072
	Within Groups	6.813	25	.273	
	Total	8.966	28		
3.3e	Between Groups	.241	3	.080	.879
	Within Groups	9.000	25	.360	
	Total	9.241	28		
3.3f	Between Groups	1.491	3	.497	.385
	Within Groups	11.750	25	.470	
	Total	13.241	28		

Table 4.6.6 – Group perception towards variables V14 to V19

The Anova test result reveals that there is **statistically significant difference** in perceptions of the respondents from the different job classification groups towards the study variable V15. The statement **p** significance value is 0.035, which is less than **0.05** (this means respondents from the job classification group have significant difference in their perceptions towards the study statement and there is substantial difference in their opinions towards the study statement).

The Anova test result reveals that there is **no statistically significant difference** in perceptions of the respondents from the different job classification groups towards the study variables V14, V16, V17, V18, and V19. The statements **p** significance values are above **0.05** (this means respondents from the job classification group have significant difference in their perceptions towards these study statements and there is substantial difference in their opinions towards these study statements).

ANOVA

		Sum of Squares	df	Mean Square	Sig.
3.4a	Between Groups	2.394	3	.798	.254
	Within Groups	13.813	25	.553	
	Total	16.207	28		
3.4b	Between Groups	.134	3	.045	.917
	Within Groups	6.625	25	.265	
	Total	6.759	28		
3.4c	Between Groups	1.890	3	.630	.255
	Within Groups	10.938	25	.438	
	Total	12.828	28		
3.4d	Between Groups	.894	3	.298	.505
	Within Groups	9.313	25	.373	
	Total	10.207	28		

Table 4.6.7 – Group perception towards variables V20 to V23

ANOVA

		Sum of Squares	df	Mean Square	Sig.
3.4e	Between Groups	.716	3	.239	.430
	Within Groups	6.250	25	.250	
	Total	6.966	28		
3.4f	Between Groups	.261	3	.087	.870
	Within Groups	9.188	25	.368	
	Total	9.448	28		
3.4g	Between Groups	2.388	3	.796	.253
	Within Groups	13.750	25	.550	
	Total	16.138	28		

Table 4.6.8 – Group perception towards variables V24 to V26

The Anova test result reveals that there is **no statistically significant difference** in perceptions of the respondents from the different job classification groups towards the study variables V20, V21, V22, V23, V24, V25 and V26. The statements **p** significance values are above **0.05** (this means respondents from the job classification group have significant difference in their perceptions towards these study statements and there is substantial difference in their opinions towards these study statements).

ANOVA

		Sum of Squares	df	Mean Square	Sig.
3.5a	Between Groups	3.765	3	1.255	.166
	Within Groups	17.063	25	.683	
	Total	20.828	28		
3.5b	Between Groups	1.821	3	.607	.402
	Within Groups	14.938	25	.598	
	Total	16.759	28		

Table 4.6.9 – Group perception towards variables V27 & V28

The Anova test result reveals that there is **no statistically significant difference** in perceptions of the respondents from the different job classification groups towards the study variables V27 and V28. The statements **p** significance values are above **0.05** (this means respondents from the job classification group have significant difference in their perceptions towards these study statements and there is substantial difference in their opinions towards these study statements).

4.6.3 Chi-Square test

The Chi-Square test was conducted on the survey instrument (questionnaire) statements to evaluate relationships between the study statements. Only one significant relationship was seen, this was between question 6a and 7a in the questionnaire.

The results for question 6a versus question 7a (Most important Organizational Role and Capability versus The most important Interpersonal Skill) is detailed in Table 4.6.10

Interpretation Rule:

- If p value is less than or equal $p \leq 0.05$, there is **statistically significant** relationship.
- If p value is greater than $p > 0.05$, there is **No statistically significant** relationship

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	51.221	28	.005
N of Valid Cases	29		

Table 4.6.10 – Relationship between question 6a and 7a

The Chi-square (χ) test result indicates **p** value **0.005**, which is less than 0.05, this result reveals there is statistically **significant relationship** between statement 6a and statement 7a, these two statements are associated, and dependent on each other.

4.7 Conclusion

This chapter provided information, results and specific analysis of data collected from employees within Denel UAVS. The composition of the samples was discussed and descriptive frequency statistics reflected respondents' answers to specific questions.

The results included both descriptive and inferential statistics. The descriptive statistics included graphical and tabular representation of frequencies in response. It also included analysis and application of central tendency statistics to determine average opinions of the respondents and finally included analysis and interpretation of various open-ended and rating questions.

The inferential statistics included a Cronbach Alpha test (Reliability Test), an Anova test and a Chi-Square test on response to specific variables and statements of the research instrument.

In the next chapter, the research results and the analysis of the data will be used to make conclusions and recommendations. This, together with the limitations to this study, will also be discussed in the next chapter.

CHAPTER 5

CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

5.1 Introduction

After analysing, applying statistical techniques and discussing the data collected, this chapter will focus on meeting the research objectives, drawing conclusions from the research, evaluating the limitation of the research and will offer recommendations.

5.2 Conclusions

This research project focuses on understanding the reasons why projects executed within Denel UAVS do not meet the objectives as set out in beginning of the project and inevitably, the project fails. The conclusions formulated in the theoretical study and the empirical study will be discussed in the sections to follow.

5.2.1 Literature Review

Literature on project failure is widely available in the Project Management Journals, in Internet Articles and Discussion Forums, in White Papers and in Research Documents (Appendix – B). There are a myriad of articles and experiences of individuals and organisations implementing Information Technology Projects, Enterprise System Implementation Projects and Business Process Reengineering Projects. However, the basic principles and practices of project management remain the same for every project. The shared experiences of individuals and lesson learned from these projects are of immense benefit when wanting to understand why projects go wrong.

After reviewing the literature, twelve common themes surfaced regarding the reasons for project failure. Of the twelve themes, eight were chosen for discussion due to the frequency and prominence of the said subject matter, being cited in the literature.

From the literature review, it was concluded that project success can be defined as a project that is on schedule (on time), within the agreed budget (cost) and the

deliverables meet and exceed the stakeholder's requirements (quality). If a project does not meet these stated objectives the chances of it being a failure is great.

5.2.2 Empirical Study

The objective of the empirical study of this research was to meet the objectives formulated in chapter two. Quantitative data was gathered from employees within Denel UAVS via the means of a self-administered questionnaire.

The sample size consisted of questionnaires being forwarded to 48 direct employees within Denel UAVS. The participants of the survey were selected on a probability basis, based on the concept of random selection. A total of 29 respondents participated by completing the questionnaires in the survey. The response received (response rate) from employees of Denel UAVS was 60.42 % of the sample size. Out of the total of 29 respondents, all the respondents completed all the questions in the questionnaires.

The results obtained from the analysis of the data in chapter 4, will be used meet the research objectives listed in the next section.

5.3 Research Objectives

1) To evaluate the effect the current project management process (within Denel UAV) has on project success

To meet this objective results obtained from the survey and the statistical analysis of question 3 of the questionnaires will be used. Question three of the questionnaire contained statements formulated from PMBOK (2004). These statements define the best practices to be employed within any project management process.

The results obtained from the survey for Question 3.1 – Project Initiation reveal, respondents “disagree” with statements in variables V3 and V4. The mean value for these variables is 2.00; this indicates that the respondents have articulated average perception to disagree towards variables V3 and V4. The mode value of 2.00 concurs with the medium value; this indicates the most frequent response to the variable V3 and V4 is disagree. The conclusion drawn from the results for the Project Initiation Process within Denel UAVS, suggests that (1) Lessons Learnt from previous similar projects are not incorporated in all new projects, (2) Human Resource requirements are not adequately addressed by Denel UAVS before all new projects are started.

The results obtained from the survey for Question 3.2 – Project Planning, reveal, respondents “disagree” with statements in variables V5, V7, V10, V11 and V12. The mean value for these variables is 2.00; this indicates that the respondents have articulated average perception to disagree towards variables V5, V7, V10, V11 and V12. The mode value of 2.00 concurs with the medium value; this indicates the most frequent response to the variable V5, V7, V10, V11 and V12 is disagree. The conclusion drawn from the results for the Project Planning Process within Denel UAVS suggests that; (1) High-level project plans within Denel UAVS does not define all the activities with the lifecycle of the project. (2) Human Resource requirements (consistent with variable V4), project roles and responsibilities and reporting relationships are not clearly defined in the project plan. (3) Quality Plans prepared for the projects do not identify all the quality standards that are relevant to the project and do not stipulate how to satisfy them. (4) The Communication plan for the project does not adequately describe the information and communication needs of the project stakeholders. (5) The Risk Management plan for the project does not clearly describe how to approach, plan and execute risk management activities of the project.

The results obtained from the survey for Question 3.3 – Project Execution, reveal, respondents “disagree” with statements in variables V14, V15, V116, and V17. The mean value for these variables is 2.00; this indicates that the respondents have articulated average perception to disagree towards variables. V14, V15, V116, and V17. The mode value of 2.00 concurs with the medium value; this indicates the most frequent response to the variable V5, V7, V10, V11 and V12 is disagree. The conclusion drawn from the results for the Project Execution Process within Denel UAVS, suggests that (1) Project Managers at UAVS do not work in strict accordance to the project plan defined for the project. (2) Quality assurance activities are not systematically applied in accordance with the Project Quality Management Plan to ensure that all processes within the project meet the required results (3) Human Resources required for executing the project are not contracted to the project in accordance to the resource requirements (consistent with variable V7) stipulated in the project plan. (4) UAVS Project team members’ competencies are not enhanced through continuous training to ensure that the team has the required skills to execute the project as defined in the project plan.

The results obtained from the survey for Question 3.4 – Project Monitoring and Control, reveal, respondents “disagree” with statements in variables V22 and V23. The mean value for these variables is 2.00; this indicates that the respondents have articulated average perception to disagree towards variables V22 and V23. The mode value of 2.00 concurs with the medium value for variable V23 only; this indicates the most frequent response to the variable V23 is disagree. However, the mode value for V22 does not concur with the mean value. The standard deviation for variables V22 and V23 is 0.677 and 0.604 respectively; this indicates that there is similarity in respondents’ perception. The conclusion drawn from the results for the Project Monitoring and Control Process within Denel UAVS, suggests that (1) Project risks are not monitored and tracked to those identified in the Risk Management Plan to ensure that the appropriate risk abatement actions are being executed. (2) Product quality is not monitored against the adherence of the Project Quality Plan and the relevant standards stipulated therein.

The results obtained from the survey for Question 3.5 – Project Closure reveal, respondents “disagree” with the statement in variable V28. The mean value for this variable is 2.00; this indicates that the respondents have articulated average perception to disagree toward variable V28. The mode value of 2.00 concurs with the medium value; this indicates the most frequent response to variable V28 is to disagree. The conclusion drawn from the results for the conclusion drawn for the Project Closure Process within Denel UAVS suggests that no formal Project Closure meeting is convened and a no checklist is completed by cross checking the project deliverables against the Project Plan.

With all the inadequacies and anomalies in the Project Management Process with Denel UAVS when evaluated against the best practice Project Management Process stipulated by PMBOK (2004), one can conclude that the effect of the current Project Management Process practice in Denel UAVS is not conducive to project success and this will lead to projects not meeting the desired outcomes as stipulated in the beginning of the project. Therefore the project will be considered unsuccessful.

2) To evaluate the effect size and complexity of projects executed within Denel UAVS has on project success.

To meet this objective results obtained from the survey and the analysis of question 4b of the questionnaires will be used. Response to this question showed that 38% of the respondents chose the size of projects normally undertaken by Denel UAVS to be between R 50 million to R 100 million

80% of the respondents rated the level of complexity of projects normally executed in Denel UAVS as high, 65% rated the level of uncertainty as medium, 83 % rated the level of resource criticality as high, 75% rated the level of differentiation as medium and 65% of the respondents rate the level of technology complexity as high.

As can be deduced from the above figures, projects normal undertaken by Denel UAVS are higher than R100 million, with a high level of complexity, medium level of uncertainty, high level of resource criticality, medium level of differentiation and a high level of technology complexity.

In conclusion, this research objective could not be met conclusively, however three of the five elements were rated high and the others rated medium, based on this, the researcher's opinion is that size and complexity of the projects being executed in Denel UAVS does influence project success. This question could provide a research topic for future studies within the organisation.

3) To establish the most important interpersonal skill required by project managers, within Denel UAVS for project success.

Respondents were asked in question 7a of the survey questionnaire to choose from a list of defined interpersonal skills namely; leadership, strong teambuilding skills, effective communication skills, ability to motivate, problem solving skills and negotiating skills. One of the most important interpersonal skills selected by respondents for project success within Denel UAVS is leadership. 59% of the respondents unanimously chose, as the most important attribute for a Project Manager in Denel UAVS to possess is "Leadership". 17% chose Effective communication skills, 134% chose Ability to motivate, 7% chose Problem-solving skills, 3% chose Strong Team Building and 0% chose Negotiating Skills.



Respondents were further asked in question 7b of the survey instrument to choose from a list of defined traits namely; Personal Integrity, Professional Integrity, Eagerness, Decisiveness, Truthfulness, Confident, Well Organized, Even Tempered. 38% chose Professional Integrity, 31% chose Well Organized, and 21% chose Personal Integrity, 7% chose Decisiveness, 3% chose Eagerness and zero response was received for Decisiveness, Truthfulness and confident.

In conclusion, to ensure project success within Denel UAVS, project managers need to exhibit strong leadership skills, possess professional and personal integrity and be well organised. To meet the research objective, the most important interpersonal skills needed by Project managers within Denel UAVS to ensure project success is leadership.

4) To evaluate the influence the current organisational structure within Denel UAVS has on project success.

In this research objective, the researcher will evaluate all the organisational influences that were used to solicit an opinion from the respondents pertaining to an environment conducive to project success. Analysis of the data received in question 5a and 5b of the survey questionnaire, where respondents were asked to “indicate the type of organisational structure currently being adopted by Denel UAVS”. 52% indicated Project Based Structure, 31% indicated Functional Type, and 17% indicated Matrix Type and zero response for Other.

Respondents were subsequently asked to indicate, “Which type of organisational structure is most appropriate and conducive to successful execution of projects within Denel UAVS?” 41 % indicated Project Base Structure, 41% indicated Dependent of the type of project being executed, 11% indicated Functional Type and 7% indicated Matrix.

Respondents were asked in question 6a of the survey questionnaire to choose from a list the one most important Organisational Role or Capability required for a successful project in UAVS. The top three responses are as follows: 35% chose Support Function performance against contracted milestones. 28% chose, empowering the Project Manager with sufficient authority, clear responsibility and defined accountability and 17% chose Teamwork.

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From the above analysis it is evident that respondents are unsure as to the type of Organisational Structure being utilised within Denel UAVS or the possibility exists that Multiple type Structures are being utilized within the organisation. It is also concerning to note that 41 % of the respondents indicated that the project structure most conducive to project success is dependent on the type of project being executed. It is evident that the current organisational structure in place within Denel UAVS cannot cope with a diversity of projects.

In conclusion, the Organisational Structure within Denel UAVS seems to be inadequate to support the success of projects. There still seems to be elements of vertical bureaucracies within the organisation. 41 % of the respondents hold the opinion that the project structure should be dependent on the type of project being executed and 28% of the respondents hold the opinion that empowering the Project Manager with sufficient authority, clear responsibility and defined accountability is the most important role and capability required for project success. The organisational culture is not aligned with a project culture that supports project success. Cook (1999) explains that most organisations are generally vertical bureaucracies, nonetheless project management cuts across these vertical structures placing the authority and accountability for the required project results in the hand of the project manager.

Based on the above analysis the organisational structure within Denel UAVS has a direct influence on project success. The organisational structure should compliment the project requirement.

5.4 Limitations

The limitations to the research are discussed in the following section pertaining to the literature review and the empirical study.

As mentioned previously, literature on project failure is widely available in the Project Management Journals, in Internet Articles and Discussion Forums, in White Papers and in Research Documents. Many documented articles, documented experiences of individuals and organisations implementing Information Technology Projects, Enterprise System Implementation Projects and Business Process Reengineering Projects are easily available. However there are a limited number of cases on Project failure studies within Aerospace Companies. Most of the information contained in these

limited studies is either company confidential or classified, making it extremely difficult for drawing comparisons between similar type Aerospace Companies. This restricted access to information inhibits the benchmarking of best practices between similar Aerospace companies.

A possible topic for future research could be: “Does the phenomenon of project failure present itself to the same magnitude and effect amongst similar Aerospace Companies.”

The following limitations of the empirical research need to be considered:

No biographical data was gathered from the respondents due to it having no relevance to the study and its omission has not influenced the results.

The analysis of the survey data collected and the results obtained were not conclusive enough to meet the study objective: *“To evaluate the effect of size and complexity of projects executed within Denel UAVS on project success.”*

5.5 Recommendations

After the literature review and the empirical part of this study many suggestions for improvements and topics for future research can be generated. The following recommendations based on the result of this study can be formulated for Denel UAVS.

5.5.1. Recommendation One

The project management processes currently practised within Denel UAVS reveals inadequacies and inefficiencies when assessed against the best practice project management process defined by PMBOK (2004). Management intervention and improvement is required in the areas of Project Management defined below:

Lesson learnt from previous similar projects need to be incorporated in all new projects; project budgets need to make provisions for such improvements.

The current human resources available in UAVS seems to be insufficient to address all project activities or it appears that employees are overloaded with work.

Quality Plans and the assurance of quality on projects are currently inadequate. The Quality Assurance on projects needs to be improved and the implementation of an International Standard such as ISO 10006:1997, Quality management - Guidelines to quality in Project Management, needs to be considered.

Risk Management on projects and the abatement of risks seem to be inadequate within the project management environment. Risk management needs to be incorporated in all projects and the successfully management of identified risks needs to tracked and monitored regularly.

Communication between project team members and stakeholders needs to be streamlined and formalised. This could be achieved using a defined Communication Plan for each project.

Project team members skills and competencies need to be regularly evaluated to ensure human resources have the required and specialised skills needed for executing projects successfully. Skills and Human Resource Development programmes need to include training to improve employees' skills and competencies.

Project performance and measurement of progress need to be measured against the Project Plan formulated for the project. Regular reporting on project performance and progress must follow the format of reporting against the project plan.

Projects need to be closed by cross checking the deliverables against the Project Plan.

5.5.2 Recommendation Two

The current Organisational Structure needs to follow a strong project-base type structure. The culture within Denel UAVS needs to be aligned with a Project Culture that supports project success, examples, Project Managers within Denel UAVS need to be empowered with sufficient authority, clear responsibility and defined accountability to ensure project success. Another example is, human resources required between projects need to be managed by the Project Managers and not by line managers as found in typical functional type organisational structures.

5.5.3 Recommendation Three

Support Function performance needs to be monitored and controlled via the means of contract agreements e.g. Service Level Agreements and formalised Work Authorisations: progress need to be measure against these contract agreements.

5.5.4 Recommendation Four

Within Denel UAVS there must to be common understanding amongst project team members surrounding the definition of project success. This is a pre-requisite to ensure all project team members strive towards a single agreed goal.

5.6 Chapter Summary

In this final chapter of the research study, conclusions were reached after evaluation of the literature review and the empirical study, followed by the limitations associated to this research project. The chapter was concluded with recommendations being made by the researcher to Denel UAVS management, pertaining to areas for improvements within the Project management domain of the company.

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APPENDIX A – LETTER EXECUTIVE MANAGER DENEL UAVS



Your reference : 204519205

Our reference :

Date : 29 June 2006

**Graduate School of Business
Westville Campus, University of KwaZulu-Natal
University Road, Westville, Durban**

RE: Dissertation Mr A.S. Raghu

Mr Abhinash Raghu a student of the Graduate School of Business at the University of KwaZulu-Natal and also a permanent employee of Denel: Unmanned Vehicles System (UAVS), shared his interest in assessing Project Management with Denel UAVS.

Due to the challenges experienced in executing our contractual obligations with both local and overseas clients, it would be beneficial for Denel UAVS to understand the reasons why projects executed with UAVS do not meet the objectives as set out in beginning of the project, inevitable the projects fail and this impacts to the profitability, perceived image, reputation and credibility of the company.

One of the core skill required in Denel UAVS is project management, therefore Mr Raghu has suggested that, in trying to understand the reasons for project failure within UAVS, the focus should be on the project management process within the organisation and the social interaction of staff involved in the project management process.

I Tsepo Monaheng the Executive Manager: Denel UAVS, give permission to Mr Abhinash Raghu to conduct research on the Project Management Process within Denel UAVS, under the proviso that the research will be conducted without affecting his current job outputs and the participation of individuals within the Denel UAVS is purely on a voluntary basis.

The results obtain from the analysis of survey must be communicated to the Denel UAVS Management team, as it will be used as Business Improvement drivers to improve our internal business processes within Denel UAVS. Prior to submission to the Graduate School of Business the document will have to be approved by myself.

I wish Mr Raghu all the success in his Dissertation for partial fulfillment of his MBA degree with the University of KwaZulu Natal.

**TSEPO MONAHENG
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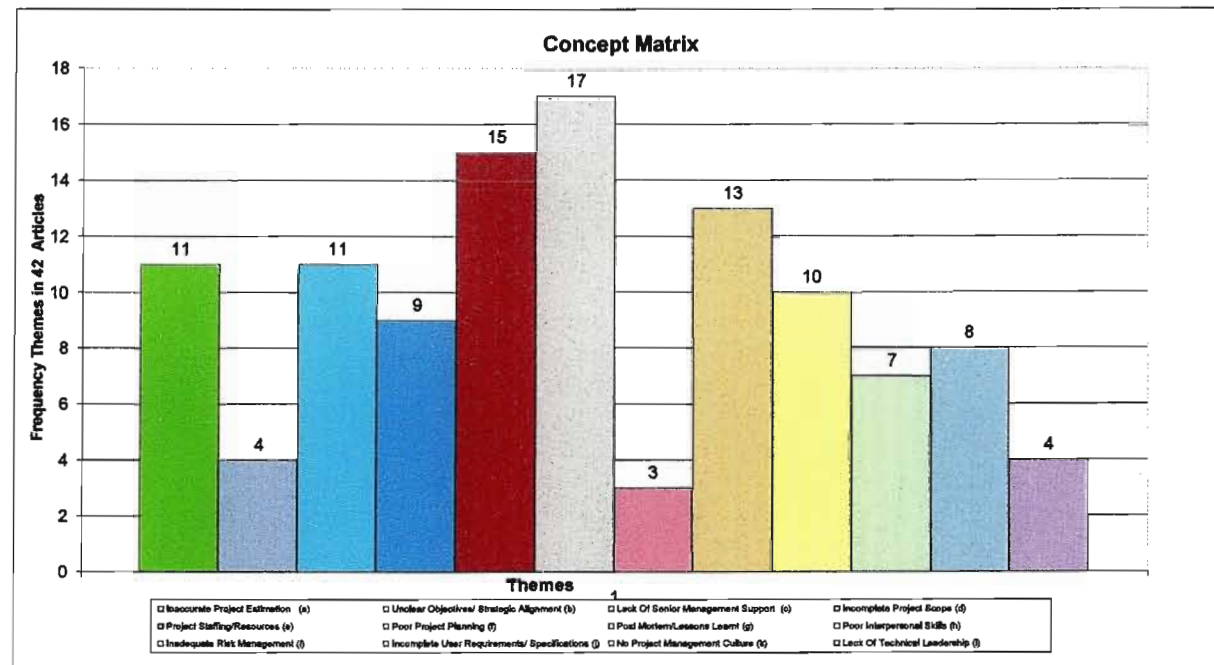
Issue date: 2 June 2006

APPENDIX B – CONCEPT MATRIX

APPENDIX B: CONCEPT MATRIX - PROJECT FAILURE

[illegible]

X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G
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APPENDIX C – QUESTIONNAIRE

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PROJECT MANAGEMENT SURVEY: DENEL UAVS

INTRODUCTION

The purpose of this questionnaire is to understand why technical projects within Denel UAVS fail to meet the objectives as set out in the beginning of the project. The results obtained from this survey will be communicated to the UAVS Management Team and the results will also be used to promote improvement of the Project Management Process within UAVS. This survey will use the "best practice" project management process as described in the Project Management Body of Knowledge (PMBOK), 2004 edition, as a benchmark for evaluating the project management process within UAVS.

You, being a valued contributor to the project management process within Denel UAVS are, invited to participate in this survey to determine the reasons for **Technical Projects failure within Denel UAVS**. This survey will be distributed to randomly selected employees that are directly involved in the **Project Management Process** within **Denel UAVS**.

Your participation in this study is completely voluntary. There are no foreseeable risks associated with participating, however, if you feel uncomfortable answering any questions, you can withdraw from the survey at any point.

Your survey responses will be strictly confidential and data from this research will be reported only as statistics. Your information will be coded and will remain confidential. At no time will anyone be able to trace your answers back to you. Please devote **15 minutes** of your valuable time to the completion of this questionnaire.

If you have questions at any time, about the survey or the procedures, you may contact **Abhinash Raghu** at **012 – 671 2661** or by email at the specified email address: abhinash.raghu@kentron.co.za

Responses to this survey can be sent back directly to me via e-mail, or alternatively it can be printed and sent to me be via internal mail.

* Please tick one of the appropriate ☐ ☒ box

1. ORGANISATIONAL INVOLMENT

a. Please indicate your job classification.

Top Management	<input type="checkbox"/>
Senior Management	<input type="checkbox"/>
Professionally Qualified / Experienced Specialists / Middle-Management	<input type="checkbox"/>
Skilled Technical & Academically Qualified / Junior Management	<input type="checkbox"/>
Semi-Skilled	<input type="checkbox"/>
Other (Describe)	<input type="text"/>

b. How many years have you been employed by Denel UAVS?

0 - 1 years	<input type="checkbox"/>	1 - 5 years	<input type="checkbox"/>
5-10 years	<input type="checkbox"/>	More than 10 years	<input type="checkbox"/>

2. TECHNICAL PROJECT INVOLVEMENT

- a. Please indicate your area of project involvement?

<i>Contract Management</i>	<input type="text"/>
<i>Project Management</i>	<input type="text"/>
<i>Engineering</i>	<input type="text"/>
<i>Production</i>	<input type="text"/>
<i>Product Testing and Integration</i>	<input type="text"/>
<i>Product Installation and Commissioning</i>	<input type="text"/>
<i>Customer Support</i>	<input type="text"/>
<i>Support Services (Quality, Configuration, HR, Finances, IT, Procurement)</i>	<input type="text"/>

3. PROJECT MANGEMENT PROCESS

3.1 Project Initiation

- a. All new technical projects performed in Denel UAVS are formally authorized and approved by senior management before commencement

strongly agree *agree* *disagree* *strongly disagree*

- b. Programme Management Plans contain, "what work is to accomplish and what deliverables need to be produce".

strongly agree *agree* *disagree* *strongly disagree*

- c. Lessons learned from previously similar projects are incorporated in all new projects, i.e. planning and execution and closing phases.

strongly agree *agree* *disagree* *strongly disagree*

- d. Human resource requirements for the project are adequately addressed before all new technical projects are started within Denel UAVS

strongly agree *agree* *disagree* *strongly disagree*

3.2 Project Planning

- a. High-level project plans within UAVS define all the activities within the lifecycle of the project, i.e. planning, executing, controlling and closure phase.

strongly agree *agree* *disagree* *strongly disagree*

- b. The Project Scope of work as contained in the project plan is complete and gives an accurate description of the end products or deliverables.

strongly agree ☐ *agree* ☐ *disagree* ☐ *strongly disagree* ☐

- c Human Resource requirements, project roles and responsibilities and reporting relationships are clearly defined in the project plan

strongly agree ☐ *agree* ☐ *disagree* ☐ *strongly disagree* ☐

- d The cost estimation for projects in UAVS reflects the resource requirements needed to complete the project activities.

strongly agree ☐ *agree* ☐ *disagree* ☐ *strongly disagree* ☐

- e The cost budget, for the project with UAVS is a rollup of the cost estimation for each project Work Break Down Structure (WBSE).

strongly agree ☐ *agree* ☐ *disagree* ☐ *strongly disagree* ☐

- f Quality Plans prepared for the project identifies all quality standards that are relevant to the project and stipulates how to satisfy them.

strongly agree ☐ *agree* ☐ *disagree* ☐ *strongly disagree* ☐

- g The communication plan for the project adequately describes the information and communication needs of the project stakeholders.

strongly agree ☐ *agree* ☐ *disagree* ☐ *strongly disagree* ☐

- h The Risk Management Plan for the project clearly describes how to approach, plan and execute the risk management activities of the project.

strongly agree ☐ *agree* ☐ *disagree* ☐ *strongly disagree* ☐

- i The project procurement schedule of what to purchase and when to purchase is included in the project plan

strongly agree ☐ *agree* ☐ *disagree* ☐ *strongly disagree* ☐

3.3 Project Execution

- a Project Managers at UAVS work in strict accordance to the project plan defined for the project to accomplish the work defined in the project scope.

strongly agree ☐ *agree* ☐ *disagree* ☐ *strongly disagree* ☐

- b Quality assurance activities are systematically applied in accordance with the Project Quality Management Plan to ensure that all processes within the project meet the required results.

strongly agree ☐ *agree* ☐ *disagree* ☐ *strongly disagree* ☐

- c Human Resources required for executing the project are contracted to the project in accordance to the resource requirements stipulated in the project plan

strongly agree ☐ *agree* ☐ *disagree* ☐ *strongly disagree* ☐

- d UAVS Project team member's competencies are enhanced through continuous training to ensure that the team has the required skills to execute the project as defined in the project plan.

strongly agree ☐ *agree* ☐ *disagree* ☐ *strongly disagree* ☐

- e Project information is available to the relevant stakeholders in a timely manner in accordance to the project communication plan

strongly agree ☐ *agree* ☐ *disagree* ☐ *strongly disagree* ☐

- f Suppliers and subcontractors of strategic resources and core skills are contracted in accordance with the project management plan.

strongly agree ☐ *agree* ☐ *disagree* ☐ *strongly disagree* ☐

3.4 Project Monitoring and Control

- a In Denel UAVS Project performances is measured and compared to the actual performance of the project against the project plan

strongly agree ☐ *agree* ☐ *disagree* ☐ *strongly disagree* ☐

- b Within UAVS, project performance is assessed to determine if any corrective or preventative actions are required to ensure that the project meets the required objectives.

strongly agree ☐ *agree* ☐ *disagree* ☐ *strongly disagree* ☐

- c Project risks are monitored and tracked to those identified in the Risk Management Plan to ensure that the appropriate risk abatement actions are being executed.

strongly agree ☐ *agree* ☐ *disagree* ☐ *strongly disagree* ☐

- d Product quality is monitored against the adherence of the Project Quality Plan and the relevant standards stipulated therein.

strongly agree ☐ *agree* ☐ *disagree* ☐ *strongly disagree* ☐

- e Project costs are monitored and controlled in accordance to the project cost rollup and measured against the project cost targets.

strongly agree ☐ *agree* ☐ *disagree* ☐ *strongly disagree* ☐

- f The project schedule is monitored and controlled in accordance with the project schedule defined in the project plan and is measured against the contractual delivery schedule.

strongly agree ☐ *agree* ☐ *disagree* ☐ *strongly disagree* ☐

- g Project team member's performances are monitored and controlled in accordance with the contracting agreements (WA / SOW).

strongly agree ☐ *agree* ☐ *disagree* ☐ *strongly disagree* ☐

3.5 Project Closure

- a Projects within UAVS are closed once the Customer has received the deliverables and all levels of the Project Work Break Down Structure have been administratively closed on SAP.

strongly agree ☐ *agree* ☐ *disagree* ☐ *strongly disagree* ☐

- b A formal Project Closure meeting is convened and a checklist is completed, by cross checking the project deliverables against the Project Plan.

strongly agree ☐

agree ☐

disagree ☐

strongly disagree ☐

4. CHARACTERISTICS OF PROJECTS EXECUTED IN UAVS

- a Please indicate the size of projects normally undertaken by Denel UAVS

<i>Below R 10 million</i>	<input type="checkbox"/>
<i>Between R 10 million and R 50 million</i>	<input type="checkbox"/>
<i>Between R 50 million and R 100 million</i>	<input type="checkbox"/>
<i>Between R 100 million and R 150 million</i>	<input type="checkbox"/>
<i>Above R 200 million</i>	<input type="checkbox"/>

- b Please rate the characteristics of projects normally undertaken by Denel UAVS

PROJECT CHARACTERISTICS	LOW	MEDIUM	HIGH
<i>Level of Complexity</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Level of Uncertainty</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Level of Resource Criticality</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Level of Differentiation</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Level of Technology Complexity</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. ORGANIZATIONAL STRUCTURE

- a Please indicate the type of organizational structure currently being adopted by Denel UAVS

<i>Matrix type Organization Structure</i>	<input type="checkbox"/>
<i>Functional type Organization Structure</i>	<input type="checkbox"/>
<i>Project based Organizational Structure</i>	<input type="checkbox"/>
<i>Other</i>	<input type="checkbox"/>

- b In your opinion which type of organizational structure is most appropriate and conducive to successful execution of projects with Denel UAVS

<i>Matrix type Organization Structure</i>	<input type="checkbox"/>
<i>Functional type Organization Structure</i>	<input type="checkbox"/>
<i>Project based Organizational Structure</i>	<input type="checkbox"/>
<i>Depends on the type of Project being executed.</i>	<input type="checkbox"/>

6. ORGANIZATIONAL ROLES AND RESPONSIBILITIES

a Please select from the list below the one most important Organizational Role or Capability required for a successful project in UAVS.

Senior Management Support	<input type="checkbox"/>
Support Function performance against contracted milestones, i.e. Procurement, Quality, Human Resources, etc.	<input type="checkbox"/>
Infrastructure and Equipment	<input type="checkbox"/>
Fostering a Project Management culture	<input type="checkbox"/>
Equipping project team members with the correct skills and competencies required by the project.	<input type="checkbox"/>
Teamwork	<input type="checkbox"/>
Organizational values	<input type="checkbox"/>
Ensuring project management processes and procedure are in place and established as a Company Organizational Standard and Documentation (COSAD)	<input type="checkbox"/>
Efficiencies and effectiveness of processes within UAVS	<input type="checkbox"/>
Empowering the Project Manager with sufficient authority, clear responsibility and defined accountability.	<input type="checkbox"/>
Technical Leadership	<input type="checkbox"/>
Clearly communicated organizational goals and objectives associated with the project.	<input type="checkbox"/>

7. PROJECT MANAGERS SKILLS AND CAPABILITIES

a Please select from the list below the, one of most important interpersonal skills required by the project manager to ensure a project successful in UAVS.

Leadership	<input type="checkbox"/>
Strong teambuilding skills	<input type="checkbox"/>
Effective communication skills	<input type="checkbox"/>
Ability to motivate	<input type="checkbox"/>
Problem solving skills	<input type="checkbox"/>
Negotiating skills	<input type="checkbox"/>

b Select from the list, one of the most important personal trait required by project managers to ensure project success in UAVS.

Personal Integrity	<input type="checkbox"/>
Professional Integrity	<input type="checkbox"/>
Eagerness	<input type="checkbox"/>

Decisiveness

☐

Truthfulness

☐

Confident

☐

Well Organised

☐

Even Tempered

☐

8.GENERAL

- a Please identify one definition from the list below, which in your opinion, is the best definition of a successful project in Denel UAVS.

The project objectives meets customer requirements

☐

The project meets the target cost, schedule, quality and product functionality

☐

The product meets customer satisfaction

☐

The deliverables were produced on time and within the budget

☐

The project was performed efficiently and effectively

☐

The project satisfied the business requirements and meet the objectives of the stakeholders

☐

Other (Describe)

- b Please select one reason from the list below, which in your opinion is the most important reason for technical projects not meeting the desired outcomes in UAVS.

Incorrect project estimation in the proposal phase of the contract

☐

Incomplete project scope

☐

Poor Project Planning

☐

Inadequate Staffing of project resource requirements

☐

Incomplete Customer Requirements

☐

Incomplete Risk Management

☐

No Project Management Culture

☐

Poor Project Manager Interpersonal Skills

☐

Lessons learnt from previous projects not incorporated in new projects

☐

Lack of Technical Skills and Technical Leadership

☐

Lack of Senior Management Support

☐

Other (Describe)

Thank You

APPENDIX D – QUESTIONNAIRE DATA RECORDING

APPENDIX D1 - DATA MATRIX

APPENDIX D2 - CENTRAL TENDENCY

APPENDIX D3 - CODE SHEET

APPENDIX D1 - DATA MATRIX

RESPONDENTS		QUESTIONNAIRE REFERENCE																													60.4%	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	TOTAL	PERCENTAGE
ORGANIZATIONAL INVOLVEMENT																																
1a	Top Management													1																	1	3.4%
	Senior Management	1														1	1	1													4	13.8%
	Professionally Qualified		1	1		1		1	1	1	1	1		1					1	1	1			1				1	1		16	55.2%
	Skilled Technical				1		1															1	1		1	1	1			1	8	27.6%
	Semi - Skilled																														0	0.0%
	Other																														0	0.0%
1b	0-1 years																										1				1	3.4%
	1-5 years				1							1		1			1														4	13.8%
	5-10 years																		1						1					4	13.8%	
	10+ years	1	1	1		1	1	1	1	1	1				1			1		1	1	1	1	1		1		1	1	1	20	69.0%
TECHNICAL PROJECT INVOLVEMENT																																
2a	Contract Management													1																	1	3.4%
	Project Management			1			1	1			1									1		1								1	7	24.1%
	Engineering	1										1	1						1		1			1		1		1		1	9	31.0%
	Production																					1				1					2	6.9%
	Product Testing				1				1							1								1							4	13.8%
	Product Installation																														0	0.0%
	Customer Support															1															1	3.4%
	Support Services		1			1				1							1								1						5	17.2%
Project Initiation																																
3.1a (V1)	1 Strongly Agree										1			1			1				1			1	1				1	7	24.1%	
	2 Agree	1	1	1	1	1	1	1	1	1		1		1	1			1	1		1				1	1		1		18	62.1%	
	3 Disagree												1							1			1					1		4	13.8%	
	4 Strongly Disagree																														0	0.0%
3.1b (V2)	1 Strongly Agree													1			1				1								1	4	13.8%	
	2 Agree	1	1	1	1		1		1	1	1		1		1	1		1		1		1	1	1	1	1	1	1		21	72.4%	
	3 Disagree					1		1											1											3	10.3%	
	4 Strongly Disagree											1																		1	3.4%	
3.1c (V3)	1 Strongly Agree													1								1								1	3.4%	
	2 Agree			1	1																	1		1			1			5	17.2%	
	3 Disagree	1	1			1	1	1	1	1		1	1		1	1		1	1		1		1				1		17	58.6%		
	4 Strongly Disagree										1					1				1					1		1		1	6	20.7%	
3.1d (V4)	1 Strongly Agree																													0	0.0%	
	2 Agree													1							1									2	6.9%	
	3 Disagree	1		1		1		1		1	1	1			1	1	1	1	1	1			1	1	1		1	1		18	62.1%	
	4 Strongly Disagree		1		1		1	1		1												1				1		1	1	9	31.0%	

[illegible]

	2 Agree	1	1							1	1					1	1	1	1		1	1			10	34.5%
	3 Disagree		1		1	1		1	1	1	1		1	1		1	1		1			1	1		16	55.2%
	4 Strongly Disagree					1															1				2	6.9%
3.3d (17)	1 Strongly Agree																								0	0.0%
	2 Agree								1		1		1	1											5	17.2%
	3 Disagree	1	1	1	1	1	1	1	1		1		1		1	1	1	1	1	1	1	1	1	1	20	69.0%
	4 Strongly Disagree										1					1					1		1		4	13.8%
3.3e (V18)	1 Strongly Agree																								0	0.0%
	2 Agree	1	1	1	1		1		1	1	1		1		1		1	1	1	1			1		15	51.7%
	3 Disagree				1		1				1	1	1		1		1	1	1	1			1	1	13	44.8%
	4 Strongly Disagree																				1				1	3.4%
3.3f (V19)	1 Strongly Agree																								0	0.0%
	2 Agree	1				1	1	1		1		1		1	1		1	1		1	1	1	1	1	18	62.1%
	3 Disagree		1	1		1			1		1		1			1	1		1	1	1	1	1	1	8	27.6%
	4 Strongly Disagree				1						1							1							3	10.3%
Project Monitoring and Control																										
3.4a (V20)	1 Strongly Agree									1		1		1											3	10.3%
	2 Agree	1		1	1			1	1		1		1	1		1		1	1	1	1		1	1	16	55.2%
	3 Disagree		1			1	1	1							1		1	1					1		8	27.6%
	4 Strongly Disagree									1											1				2	6.9%
3.4b (V21)	1 Strongly Agree																								0	0.0%
	2 Agree	1			1	1	1		1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	24	82.8%
	3 Disagree		1	1										1						1					4	13.8%
	4 Strongly Disagree					1																			1	3.4%
3.4c (V22)	1 Strongly Agree																								0	0.0%
	2 Agree	1			1		1	1	1					1			1		1	1	1	1	1	1	14	48.3%
	3 Disagree		1	1		1				1	1		1	1	1		1	1		1	1				12	41.4%
	4 Strongly Disagree										1					1						1			3	10.3%
3.4d (V23)	1 Strongly Agree												1												1	3.4%
	2 Agree			1				1				1				1		1		1		1	1		8	27.6%
	3 Disagree	1	1		1	1	1	1	1		1	1		1	1		1	1	1	1		1	1	1	19	65.5%
	4 Strongly Disagree										1														1	3.4%
3.4e (V24)	1 Strongly Agree								1				1			1									3	10.3%
	2 Agree	1	1	1	1	1	1	1			1	1	1	1		1	1	1		1	1	1	1	1	22	75.9%
	3 Disagree							1		1							1		1						4	13.8%
	4 Strongly Disagree																								0	0.0%
3.4f (V25)	1 Strongly Agree								1							1									2	6.9%
	2 Agree	1	1	1	1	1	1		1	1	1	1	1		1	1	1		1	1	1	1	1	1	22	75.9%
	3 Disagree					1							1				1		1		1				4	13.8%
	4 Strongly Disagree									1															1	3.4%
3.4g (V26)	1 Strongly Agree										1		1					1				1			4	13.8%
	2 Agree	1	1	1		1	1		1		1		1	1	1	1		1		1	1	1	1		18	62.1%
	3 Disagree				1			1	1				1				1								5	17.2%
	4 Strongly Disagree									1													1		2	6.9%
Project Closure																										
3.5a (V27)	1 Strongly Agree								1				1			1									3	10.3%
	2 Agree	1		1	1	1	1		1		1		1		1		1	1	1	1	1		1		16	55.2%
	3 Disagree		1				1						1			1							1		6	20.7%

	4 Strongly Disagree								1			1															1				4	13.8%
3.5b (V28)	1 Strongly Agree																														1	3.4%
	2 Agree		1		1		1					1			1			1		1			1			1		1		9	31.0%	
	3 Disagree	1		1		1		1	1		1	1		1		1			1		1		1		1		1		14	48.3%		
	4 Strongly Disagree								1							1		1				1		1					5	17.2%		
CHARACTERISTICS OF PROJECTS IN UAVS																																
4a	Below R10 mill																													0	0.0%	
	R10mill - R50 mill						1			1		1										1		1			1		7	24.1%		
	R50mill - R100 mill		1			1	1			1		1			1	1		1				1			1		1		11	37.9%		
	R100mill - R150 mill	1		1	1				1				1	1			1		1	1							1		11	37.9%		
	Above R200 mill																												0	0.0%		
4.b	Complexity Low				1																									1	3.4%	
	Complexity Medium									1	1	1											1				1		5	17.2%		
	Complexity High	1	1		1	1	1	1	1				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	23	79.3%		
	Uncertainty Low	1																											2	6.9%		
	Uncertainty Medium			1		1		1		1		1	1	1	1	1		1	1	1		1	1	1		1	1	1	19	65.5%		
	Uncertainty High		1		1		1		1		1		1									1				1			8	27.6%		
	Resource Criticality Low																												0	0.0%		
	Resource Criticality Medium	1				1					1					1													5	17.2%		
	Resource Criticality High		1	1	1		1	1	1	1		1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	24	82.8%		
	Differentiation Low																									1		2	6.9%			
	Differentiation Medium	1	1	1	1	1	1	1	1		1	1	1	1	1	1		1	1	1	1					1	1	22	75.9%			
	Differentiation High								1								1						1		1	1		5	17.2%			
	Technology Complexity Low																												0	0.0%		
	Technology Complexity Medium	1					1				1	1	1	1								1		1				1	10	34.5%		
	Technology Complexity High		1	1	1	1	1		1	1				1	1		1	1	1	1	1		1		1	1	1	1	19	65.5%		
ORGANIZATIONAL STRUCTURE																																
5a	Matrix			1		1				1						1												1	5	17.2%		
	Functional		1				1	1				1	1			1								1	1		1		9	31.0%		
	Project Based	1			1			1	1				1	1	1			1	1	1	1	1	1	1			1		15	51.7%		
	Other																												0	0.0%		
5b	Matrix									1																	1		2	6.9%		
	Functional							1				1									1							3	10.3%			
	Project Based	1					1	1				1		1		1		1	1					1	1		1	12	41.4%			
	Dependent on Project		1	1	1	1			1				1		1	1	1				1	1			1			12	41.4%			
ORGANIZATIONAL ROLES AND RESPONSIBILITIES																																
6a	Senior Management Support		1																										1	3.4%		
	Support Function Performance			1											1		1		1	1	1		1	1	1				10	34.5%		
	Infrastructure and Equipment																												0	0.0%		
	Project Management Culture											1																	1	3.4%		
	Skills and Competencies				1																								1	3.4%		
	Teamwork					1			1				1			1											1		5	17.2%		
	Organizational values																												0	0.0%		
	COSADS																												0	0.0%		
	Efficiency and Effectiveness						1					1																	2	6.9%		
	Empowering Project Manager	1					1				1			1			1		1				1				1		8	27.6%		
	Technical Leadership																												0	0.0%		
	Goals and Objectives							1																					1	3.4%		
	PROJECTS MANAGER'S SKILLS AND CAPABILITIES																															
7a	Leadership	1	1	1		1			1			1		1	1	1	1	1	1	1	1		1		1	1	1		17	58.6%		

[illegible]

APPENDIX D2 – CENTRAL TENDENCY FOR VARIABLES V1 to V28

		Initiation				Planning								Execution						Monitoring and Control								Closure	
N	Valid	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19	V20	V21	V22	V23	V24	V25	V26	V27	V28
	Missing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean		3.00	3.00	2.00	2.00	2.00	3.00	2.00	3.00	3.00	2.00	2.00	2.00	3.00	2.00	2.00	2.00	2.00	2.00	3.00	3.00	3.00	2.00	2.00	3.00	3.00	3.00	3.00	2.00
Median		3.00	3.00	2.00	2.00	2.00	3.00	2.00	3.00	3.00	2.00	2.00	2.00	3.00	2.00	2.00	2.00	2.00	3.00	3.00	3.00	3.00	2.00	2.00	3.00	3.00	3.00	3.00	2.00
Mode		3	3	2	2	2	3	2	3	3	2	2	2	3	2	2	2	2	3	3	3	3	2	3	3	3	3	3	2
Std. Deviation		.618	.626	.731	.591	.660	.736	.568	.677	.463	.753	.620	.468	.688	.761	.618	.670	.566	.574	.688	.761	.491	.677	.604	.499	.581	.759	.862	.774
Variance		.382	.392	.534	.350	.436	.542	.323	.458	.214	.567	.384	.219	.473	.579	.382	.448	.320	.330	.473	.579	.241	.458	.365	.249	.337	.576	.744	.599
Range		2	3	3	2	2	3	2	3	2	3	2	2	3	3	2	3	2	2	2	3	2	2	3	2	3	3	3	3
Minimum		2	1	1	1	1	1	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1
Maximum		4	4	4	3	3	4	4	4	4	4	3	3	4	4	3	4	3	3	3	4	3	3	4	4	4	4	4	4

APPENDIX D3: CODE SHEET - PROJECT MANAGEMENT PROCESS (QUESTIONS 3.1 - 3.5)

Id	Initiation 3.1				Planning 3.2									Execution 3.3						Monitoring and Control 3.4						Closure 3.5	
	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19	V20	V21	V22	V23	V24/25	V26	V27	V28
1	2	2	3	3	2	2	2	2	2	3	3	3	3	3	3	3	2	3	2	2	2	2	3	2	2	2	3
2	2	2	3	4	2	3	3	3	2	3	3	3	2	4	3	3	3	2	3	3	3	3	3	2	2	2	3
3	2	2	2	3	3	2	2	2	2	3	3	3	3	3	3	2	3	2	3	2	3	3	2	2	2	2	3
4	2	2	2	4	3	3	3	2	2	3	3	3	2	2	3	3	3	2	4	2	2	2	3	2	2	2	2
5	2	3	3	3	3	3	3	3	2	4	3	3	3	3	3	3	3	3	3	3	2	3	3	2	2	2	3
6	2	2	3	4	2	2	2	2	2	4	2	3	2	2	4	4	3	3	2	2	3	2	3	2	2	2	2
7	2	3	3	4	3	2	3	3	2	4	3	4	3	3	3	4	3	3	3	2	3	4	2	3	2	3	3
8	2	2	3	3	2	3	3	3	2	3	3	3	2	2	3	3	3	3	2	2	2	2	3	2	2	2	3
9	2	2	3	4	3	3	3	3	3	3	3	3	4	3	3	3	2	2	3	2	2	2	3	2	3	4	4
10	1	2	4	3	4	2	3	4	1	3	3	3	4	2	4	3	3	2	2	1	2	3	3	1	1	2	1
11	2	4	3	4	3	3	3	3	2	4	3	3	3	4	4	2	2	3	3	4	2	3	3	3	4	4	2
12	3	2	3	3	3	2	3	3	2	3	3	3	2	3	4	3	4	3	4	2	2	4	4	2	2	2	4
13	1	1	1	2	2	1	2	1	1	2	3	3	2	2	3	2	2	3	2	1	2	3	2	2	2	1	2
14	2	2	3	3	3	3	3	3	2	2	2	3	3	3	3	3	3	2	3	2	2	3	3	2	2	2	3
15	2	2	3	3	2	3	3	2	2	4	4	2	3	3	3	3	2	3	2	2	2	3	3	2	2	3	2
16	1	1	4	3	2	2	2	2	2	3	2	3	2	2	2	1	2	2	2	1	2	2	1	1	2	1	2
17	2	2	3	3	3	3	3	2	2	4	4	3	3	3	2	3	3	3	2	3	3	3	3	2	3	2	4
18	2	3	3	3	3	3	3	3	2	2	3	3	3	3	3	3	3	3	3	2	2	3	3	2	2	2	3
19	3	2	4	3	3	3	3	3	2	3	3	3	2	4	4	2	4	3	3	3	2	4	2	2	2	2	4
20	1	1	3	2	2	1	1	1	1	1	2	2	2	2	3	2	3	2	2	2	3	2	2	3	1	1	2
21	2	2	2	4	2	2	3	3	3	3	2	3	3	3	3	3	3	3	2	2	2	3	2	2	3	3	2
22	3	2	3	3	3	2	2	2	2	3	3	2	3	3	3	2	3	2	4	2	2	3	3	3	3	2	3
23	1	2	2	3	2	2	2	2	2	3	2	3	1	1	3	2	3	2	2	2	2	2	3	2	2	1	2
24	1	2	3	3	3	2	3	2	2	2	2	3	2	2	2	3	3	2	2	2	3	2	2	2	2	2	3
25	2	2	4	4	4	2	3	2	3	2	4	3	2	3	3	4	4	4	2	4	2	2	3	3	3	2	4
26	2	2	2	3	2	3	2	2	2	2	2	2	2	2	2	2	3	3	2	2	2	2	2	2	2	2	2
27	3	2	4	3	3	3	3	3	2	3	3	3	2	4	4	2	4	3	2	3	2	4	2	2	2	1	4
28	2	2	3	4	4	2	2	2	2	3	3	2	2	2	3	3	3	3	2	2	2	2	3	2	2	2	3
29	1	1	4	4	2	2	2	2	2	3	2	2	2	2	3	3	3	2	2	2	2	2	3	2	2	4	2

APPENDIX E – ETHICAL CLEARANCE LETTER

RESEARCH OFFICE (GOVAN MBEKI CENTRE)
WESTVILLE CAMPUS
TELEPHONE NO.: 031 – 2603587
EMAIL : ximbap@ukzn.ac.za

15 FEBRUARY 2007

MR. AS RAGHU (204519205)
GRADUATE SCHOOL OF BUSINESS

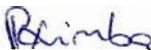
Dear Mr. Raghu

ETHICAL CLEARANCE APPROVAL NUMBER: HSS/0041/07M

I wish to confirm that ethical clearance has been granted for the following project:

"Understanding why projects fail within Denel Aerospace systems: UAVS, within the context of the project management process"

Yours faithfully


MS. PHUMELELE XIMBA
RESEARCH OFFICE

cc. Faculty Officer (Christel Haddon)
cc. Supervisor (Prof. S Lubbe)